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SACRAMENTO REGIONAL COUNTY SANITATION DISTRICT

BEFORE THE

CALIFORNIA STATE WATER RESOURCES CONTROL BOARD

In the Matter of the Sacramento Regional County Sanitation District's Petition for Review of Action and Failure to Act by Regional Water Quality Control Board, Central Valley Region, in Adopting Waste Discharge Requirements Order No. R5-2010-0114 (NPDES No. CA0077682) and Time Schedule Order No. R5-2010-0115 for Sacramento Regional County Sanitation District, Sacramento Regional Wastewater Treatment Plant.	SWRCB/OCC File No. _____ PETITION FOR REVIEW (Wat. Code, § 13320)

Petitioner Sacramento Regional County Sanitation District (District or SRCSD), in accordance with section 13320 of the Water Code and sections 2050 et seq. of Title 23 of the California Code of Regulations, hereby petitions for review of Waste Discharge Requirements Order No. R5-2010-0114 (NPDES No. CA0077682) and Time Schedule Order No. R5-2010-0115 of the Central Valley Regional Water Quality Control Board (Regional Board or RWQCB) and action or inaction of the RWQCB associated therewith.

1. NAME, ADDRESS, TELEPHONE NUMBER, AND EMAIL ADDRESS OF THE PETITIONER

Petitioner is the District, which owns and operates the Sacramento Wastewater Treatment Plant (SRWTP). Petitioner's contact information is as follows:

Sacramento Regional County Sanitation District
c/o Stan R. Dean
District Engineer
10060 Goethe Road
Sacramento, CA 95827-3553
Telephone: (916) 876-6000
Facsimile: (916) 876-6160
Email: deans@sacsewer.com

In addition, all materials in connection with this Petition, and the administrative record, should be provided to:

Somach Simmons & Dunn
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2. THE SPECIFIC ACTION OR INACTION OF THE REGIONAL BOARD WHICH PETITION REQUESTS THE STATE BOARD TO REVIEW

The District petitions the State Water Resources Control Board (State Board) to review the Regional Board's adoption of Order No. R5-2010-0114, Waste Discharge Requirements for the Sacramento Regional Wastewater Treatment Plant (Permit), and Order No. R5-2010-0115, Time Schedule Order Requiring the Sacramento Regional County Sanitation District, Sacramento

County to Comply with Requirements Prescribed in Order No. R5-2010-0114 (TSO), and action or inaction related thereto, as more fully described herein.

A copy of the Permit is attached as Exhibit A. A copy of the TSO is attached as Exhibit B.

3. THE DATE ON WHICH THE REGIONAL BOARD ACTED OR REFUSED TO ACT

The date on which the Regional Board acted or refused to act is December 9, 2010.

4. A STATEMENT OF THE REASONS THE ACTION OR FAILURE TO ACT WAS INAPPROPRIATE OR IMPROPER

A full and complete statement of the reasons why the Regional Board's actions were inappropriate or improper is provided in the accompanying Statement of Points and Authorities.

5. THE MANNER IN WHICH PETITIONER IS AGGRIEVED

The Petitioner is aggrieved by the actions or inactions of the Regional Board because the Petitioner and its ratepayers will bear the costs of, and risks of potential liabilities arising from, the Regional Board's actions and inactions that are the subjects of this Petition.

6. THE SPECIFIC ACTION REQUESTED BY PETITIONER

The District requests that the State Board review the record, the Permit and TSO (including their Findings), and this Petition, and that the State Board issue an order or orders accomplishing all of the following:

A. Grant the District's request to consider Exhibit C to this Petition, as described in section III of the Statement of Points and Authorities below.

B. Vacate the "filtration" requirements of the Permit (discussed below in section V of the Statement of Points and Authorities), and make related, consistent, and conforming revisions, as follows:

i. Vacate all of the following:

the final effluent limitations for biochemical oxygen demand (BOD), total suspended solids (TSS), and total coliform organisms contained in sections IV.A.1.a and IV.A.1.g of the Permit (pp. 13, 15);

footnote 2 of Table 6 (p. 14 of the Permit) insofar as it relates to final effluent limitations for BOD and TSS;

footnote 1 (p. 14 of the Permit) insofar as it relates to total coliform organisms;

the Construction, Operation and Maintenance Specifications for turbidity contained in Provision VI.C.4.a of the Permit (p. 30);

the Other Special Provisions requiring wastewater to be oxidized, coagulated, filtered, or equivalent by 1 December 2020 contained in Provision VI.C.6.a;

the interim effluent limitations for BOD, TSS, and total coliform organisms contained in sections IV.A.2.a and IV.A.2.c of the Permit (p. 16); and,

the compliance schedule for Title 22 of the California Code of Regulations (Title 22), or Equivalent, Disinfection Requirements contained in Provision VI.C.7.a of the Permit (pp. 33-34) as well as the reporting requirements related thereto contained in Table E-3a footnote 13 (p. E-7) and in Table E-9 of the Permit (p. E-22);

ii. Order that the final effluent limitations under the Permit for BOD, TSS, and total coliform organisms[1] shall be as follows:

BOD: 30 mg/L and 45,286 lbs/day as a monthly averages, 45 mg/L and 67,929 lbs/day as a weekly averages, and 60 mg/L and 90,572 lbs/day as a daily maximums;

TSS: 30 mg/L and 45,286 lbs/day as a monthly averages, 45 mg/L and 67,929 lbs/day as a weekly averages, and 60 mg/L and 90,572 lbs/day as a daily maximums; and,

Total Coliform Organisms: 23 most probable number (MPN) per 100 mL, as a 7-day median, 240 MPN/100 mL, no more than once in any 30-day period, and 500 MPN/100mL, at anytime.

[1] As reflected in section V of the Statement of Points and Authorities following, these limitations are derived from Disinfection Alternative No. 1, Sacramento County Sanitation District [sic], Sacramento Regional Wastewater Treatment Plant, Proposed Waste Discharge Requirements and Time Schedule Order (NPDES No. CA0077682); Regional Water Quality Control Board, Central Valley Region Board Meeting – 9 December 2010, Item #6 (document distributed November 24, 2010).

C. Vacate the final effluent limitations for ammonia (discussed in section IV of the Statement of Points and Authorities below) and remand the Permit ammonia limitations to the Regional Board for adoption of effluent limitations for ammonia with the consideration of dilution using the District's dynamic modeling results, and make related, consistent, and conforming revisions, as follows:

i. Vacate all of the following:

the final effluent limitations for Ammonia, Nitrogen Total (as N) contained in section VI.A.1.a of the Permit (p. 14);

footnote 2 to Table E-6 (p. 14 of the Permit) insofar as it applies to final effluent limitations for Ammonia, Nitrogen, Total (as N);

section VI.C.1.c (pp. 24-25 of the Permit) insofar as it applies to ammonia;

section VI.C.1.h (p. 25 of the Permit) (without prejudice to reinserting a similar provision on remand);

section VI.C.1.m (p. 26 of the Permit); and,

section VI.C.7.b (p. 34 of the Permit);

ii. In the course of addressing ammonia issues, grant the District's request to strike evidence and findings as provided in section VI.B.1.b.iv of the Statement of Points and Authorities; and,

iii. Order that the Interim Effluent Limitations for Ammonia, Nitrogen, Total (as N) in Table 7 of the Permit (p. 16) shall remain in effect until final limitations adopted on remand become effective; and,

iv. Remand the Permit final effluent limits for ammonia to the Regional Board and direct the Regional Board to develop effluent limitations for ammonia with consideration of allowances for acute and chronic mixing zones (60 and 350 feet downstream from diffuser, respectively); and,

direct the Regional Board to develop seasonal effluent limitations for oxygen-demanding substances if and as appropriate based on the Basin Plan water quality objective for dissolved oxygen, and based on the seasonal ultimate oxygen demand

(UOD) effluent limits contained in Ammonia Removal Alternative No. 2, Sacramento County Sanitation District [sic], Sacramento Regional Wastewater Treatment Plant, Proposed Waste Discharge Requirements and Time Schedule Order (NPDES No. CA0077682); Regional Water Quality Control Board, Central Valley Region Board Meeting – 9 December 2010, Item #6 (document distributed November 24, 2010), with applicable allowances and schedules for compliance.

D. Vacate the final effluent limitations for Nitrate, Total (as N) (discussed in section VII below in the Statement of Points and Authorities) and remand the Permit Nitrate, Total (as N) limitation and make related, consistent, and conforming changes as follows:

i. Vacate all of the following:

the final effluent limitations for Nitrate, Total (as N) contained in section IV.A.1.a (p. 14); and,

section VI.C.1.n (without prejudice to adopt a similar provision on remand);

ii. Remand the Nitrate, Total (as N) effluent limitation of the Permit to the Regional Board for adoption of final effluent limitations if and as necessary, based on the MCL for nitrate with allowance for dilution using the 30 Q5 receiving water flow.

E. With respect to the Permit Fact Sheet's section IV.D.4 titled Satisfaction of Antidegradation Policy (Permit pp. F-93 through F-99) (discussed in section VIII of the Statement of Points and Authorities below), irrespective of whether such provisions do or do not directly translate to specific ordering terms of the Permit[2], the District requests the State Board determine that the discussion and findings of such section of the Fact Sheet are improper for the reasons stated in section VIII of the Statement of Points and Authorities.

F. Vacate the final effluent limitations for copper, cyanide, and chlorpyrifos and diazinon, and vacate the chronic toxicity trigger (discussed in section IX below in the Statement of Points and Authorities) and remand the Permit for copper, cyanide, and chlorpyrifos and

[2] The Statement of Points and Authorities identifies other errors in the Fact Sheet, and this specific request does not imply concurrence with other provisions of the Fact Sheet.

diazinon effluent limitations and chronic toxicity trigger and make related, consistent, and conforming changes as follows:

i. Vacate all of the following:

the final effluent limitations for copper contained in section IV.A.1.a of the Permit (p. 13);

the final effluent limitations for cyanide contained in section IV.A.1.a of the Permit (p. 13);

the final effluent limitations for chlorpyrifos and diazinon contained in section IV.A.1.l of the Permit (p. 15);

Time Schedule Order No. R5-2010-0115 and interim effluent limitations contained in TSO No. R5-2010-0115 insofar as they relate to chlorpyrifos and diazinon; and,

the numeric monitoring trigger for chronic whole effluent toxicity contained in section VI.C.2.a.iii of the Permit (p. 27).

ii. Remand all of the following:

the copper effluent limitations of the Permit to the Regional Board for adoption of final effluent limitations with the allowance of acute and chronic mixing zones and dilution credits at 60 and 350 feet downstream from the diffuser, respectively, as calculated with the dynamic model;

the cyanide effluent limitations of the Permit to the Regional Board for adoption of final effluent limitations with the allowance of acute and chronic mixing zones and dilution credits at 60 and 350 feet downstream from the diffuser, respectively, as calculated with the dynamic model;

the chlorpyrifos and diazinon effluent limitations of the Permit for adoption of a final effluent limitation, based on the wasteload allocation with allowance for dilution at 60 and 350 feet downstream from the diffuser, respectively;

the numeric toxicity monitoring trigger for chronic whole effluent toxicity to the Regional Board for adoption of a numeric toxicity monitoring trigger for chronic

whole effluent toxicity with the allowance of chronic mixing zones and dilution credits of 13.3 as calculated with the dynamic model; and,

the Regional Board's denial for the allowance of an acute aquatic life mixing zone.

G. Vacate the monitoring requirement for N-nitrosodimethylamine (NDMA) contained in Attachment E section IV.A.1, and order that monitoring for NDMA be conducted with an appropriate test method.

H. Order any other necessary conforming changes consistent with the above or the Statement of Points and Authorities, and direct that other Findings and the Fact Sheet of the Permit are deemed modified consistent with the State Board's Order.

Finally, the Water Code and State Board's regulations provide for the issuance of stays of regional board orders in connection with a petition for review. At this time, the District believes that a stay will not be necessary so long as the Petition is timely resolved. However, the District may subsequently request a stay of one or more provisions of the Permit in accordance with the State Board's regulations.

7. A STATEMENT OF POINTS AND AUTHORITIES IN SUPPORT OF LEGAL ISSUES RAISED IN THIS PETITION

The District provides below a Statement of Points and Authorities, which includes support of the legal issues raised in this Petition.

8. A STATEMENT THAT THIS PETITION WAS SENT TO THE REGIONAL BOARD

A true and correct copy of this Petition was mailed by First Class mail on January 10, 2011, to the Regional Board at the following address:

Pamela Creedon
Executive Officer
California Regional Water Quality Control Board, Central Valley Region
11020 Sun Center Drive, #200
Rancho Cordova, CA 95670

As a courtesy, a true and correct copy of the Petition on compact disc (CD) was also mailed to the parties on the attached service list. Petitioner is the discharger. Therefore, Petitioner did not mail a copy of this Petition to the discharger.

9. A STATEMENT AS TO WHETHER PETITIONER RAISED THE SUBSTANTIVE ISSUES OR OBJECTIONS IN THE PETITION TO THE REGIONAL BOARD

The substantive issues or objections raised in this Petition were raised before the Regional Board.

10. PETITIONER'S REQUEST FOR CONSIDERATION OF SUPPLEMENTAL EVIDENCE

Petitioner requests that the State Board consider Exhibit C to this Petition, as discussed more fully below.

STATEMENT OF POINTS AND AUTHORITIES

I. INTRODUCTION

The Permit and TSO require State Board review and modification for numerous reasons. Overall, the Permit would result in severe consequences for the Sacramento region. Estimated compliance costs amount to over $2 billion in capital costs, coupled with additional increased operation and maintenance costs of nearly $100 million each year, all of which must be borne by the region's citizens. The Regional Board failed to give the required, meaningful consideration to the adverse impacts on residents of all economic circumstances, business and development, and the environment. These adverse impacts are not justified. The Regional Board was too committed to certain outcomes and did not consider what is reasonable and necessary in the specific circumstances of the SRWTP.

Over one-half the estimated compliance cost is for filtration technology even though Sacramento River water quality is, with the current discharge, superior to adopted water quality standards for pathogens. The record shows that the requirement would have *de minimus* benefit in terms of avoiding potential risk of gastrointestinal illness to persons who may ingest river water directly. In developing the requirements, the Regional Board did not fairly or accurately characterize evidence and ignored highly relevant, uncontroverted evidence altogether. It also deviated from its standard permitting practice for discharges to high-volume receiving waters. Further, the Regional Board gave cursory and superficial attention to its obligations under

section 13241 of the Water Code, a pillar of water quality regulatory law, and its findings related to imposing the requirements are perfunctory and simply wrong. The District's predecessor permit (Order No. 5-00-188) ensured a high degree of protection related to pathogens and its provisions should have been retained.

The Permit imposes new requirements for ammonia reduction based on factors and approaches never before applied to permits in the Central Valley region. In practice, the Regional Board has based ammonia requirements in permits on the United States Environmental Protection Agency's (U.S. EPA) ambient water quality criteria for the protection of human health. In this instance, with allowance for small and approvable mixing zones, such criteria will be met at all downstream locations. The Permit denies the mixing zones not because the mixing zone itself will adversely affect beneficial uses, but because of generally-referenced impacts of much *lower* ammonia concentrations far downstream in the Delta. The Permit does not "connect the dots" in terms of explaining why the specific limitations are necessary for protection of uses downstream. Aside from this significant regulatory error, the Permit also falls prey to the rush to "do something" in regard to the deteriorated state of certain aquatic resources in the Delta. Inceptive scientific investigation is not a cause for imposing severe burdens on the Sacramento region. As the State Board is aware, the District has been targeted in this regard, but the State Board's own hearings just last year revealed that there is not a "smoking gun" associated with SRWTP discharges. Hypotheses of a few years ago have been discarded, but the Regional Board seized on other, freshly minted hypotheses and improper conclusions to impose these costly requirements. The District has recognized that some degree of ammonia reduction will be necessary to ensure that conservative, adopted standards for dissolved oxygen are met at all times. The proper course for the State Board is to direct the Regional Board to adopt limits on oxygen demand to implement dissolved oxygen standards, with the reservation that the Permit can be reopened if a solid scientific basis for more stringent ammonia limits emerges.

The Permit's limitations on nitrate suffer from the same deficiencies as ammonia, except that the Permit lacks *even an effort* to explain why a mixing zone for nitrate is denied. In this regard, the District acknowledges that numeric water quality objectives exist for nitrate to protect

municipal use. Discharge equal to that objective is unnecessary to protect that use because the use occurs far downstream after considerable dilution. The Permit materials acknowledge as much, but deny a mixing zone for reasons that simply cannot be determined from the Permit or its findings. There is no justification for the effluent limitation.

The Regional Board sought to bolster, or create an alternative basis for, the costly Permit limitations based on a novel and superficial "antidegradation" analysis. The Regional Board signaled out the District for different treatment, performing its own conclusory antidegradation analysis for an already-permitted discharge. This was improper. Further, the Regional Board's analysis did not comply with applicable regulations and State Board guidance. The Regional Board's result-oriented and superficial findings and conclusions are inadequate and unsupported.

The Permit also includes other provisions that unnecessarily put the District at risk of noncompliance for reasons unrelated to appropriate protection of beneficial uses.

The State Board should grant the relief requested by the District for reasons explained herein and in the record.

II. BACKGROUND

A. District Operation

The District owns and operates the SRWTP. The "Background and Facility Description" Findings of the Permit (sections II.A, B) are accurate. Decades ago, the District through the SRWTP, accomplished regionalization of wastewater treatment and disposal, replacing 22 separate treatment plants.[3]

In 2000, the Regional Board adopted Order No. R5-00-188, renewing the waste discharge requirements and NPDES permit (No. CA0077682) for the SRWTP. The District has an exemplary record of compliance with that permit. In addition, the District is a leader in promoting watershed-wide understanding and collaboration in water quality issues, and is an active participant in relevant activities in the region related to water quality planning. The

[3] Meeting, State of California, Central Valley Regional Water Quality Control Board, Partial Transcript (Dec. 9, 2010), Tiffany C. Kraft, CSR (Hearing Transcript), p. 222:2-3; District's Exhibits presented at December 9, 2010, Hearing (SRCSD Hearing Exhibits), PowerPoint slide 42.

District has realized great success in its source control efforts, including, for example, with respect to mercury.[4]

B. Permit Renewal Process

The District timely filed an application for renewal of the NPDES permit for the SRWTP.[5] Based on then-projected flow increases, the District also requested an increase in permitted discharge, from the existing 181 mgd, average dry weather flow (ADWF), to 218 mgd ADWF. The District submitted "antidegradation" analyses[6] and considerable other technical information based on the requested increase and other issues related to the renewal. However, flow increases did not materialize, and in fact there was a decrease over a period of years. The District ultimately determined it unnecessary to obtain an increase in permitted discharge in connection with this renewal. By letter dated June 11, 2010, the District Engineer withdrew the request for increased permitted discharge,[7] leaving the Regional Board's action to concern only renewal of the already-permitted flow and discharge.

On September 3, 2010, Regional Board staff issued a tentative order for renewal of the SRWTP permit. (California Regional Water Quality Control Board, Central Valley Region, Tentative Order No. R5-2010-XXXX [NPDES No. CA0077682] Waste Discharge Requirements for the Sacramento Regional County Sanitation District, Sacramento Regional Wastewater Treatment Plant (Sept. 3, 2010) (hereafter, September Tentative Permit).) Staff also released a

[4] The predecessor permit included an interim performance-based effluent limitation for total mercury of 5.1 pounds per year. (Order No. R5-00-188, p. 15.) As a result of the District's source control efforts, the actual mercury mass loading from the SRWTP has been lower than that limit, such that the Permit establishes a new, interim performance-based limit of more than 50 percent lower than the previous performance-based limit. (Permit, pp. 15, F-71.) The 2000 permit had also included a provision under which loadings below its annual mass limit would be "banked" for future offset. (Order No. R5-00-188, p. 15.) Approximately 25 pounds was appropriately considered banked under this provision. Unfortunately, the new Permit eliminates the accumulated bank. (Permit, p. F-71; see RWQCB Staff Response to Written Comments for Sacramento Regional County Sanitation District, Sacramento Regional Wastewater Treatment Plant Tentative Waste Discharge Requirements (Staff Response to Comments), pp. 60-61.)

[5] Letter dated February 1, 2005, from Wendell Kido, District Manager, SRCSD, to Ken Landau, Assistant Executive Officer, RWQCB, subject: Application for NPDES Permit Renewal for the Sacramento Regional Wastewater Treatment Plant (SRWTP), NPDES Permit No. CA0077682.

[6] Larry Walker Associates, Antidegradation Analysis for Proposed Wastewater Treatment Plant Discharge Modification (Feb. 2005 and May 20, 2009).

[7] Letter dated June 11, 2010, from Mary Snyder, District Engineer, SRCSD, to Pamela Creedon, Executive Officer, RWQCB re: Request for Change in Permitted Capacity for the Sacramento Regional Wastewater Treatment Plant; see Permit, p. 4.

tentative Time Schedule Order related to certain limitations proposed in the September Tentative Permit. (California Regional Water Quality Control Board, Central Valley Region, Tentative Time Schedule Order No. R5-2010-XXXX Requiring the Sacramento Regional County Sanitation District to Comply with Requirements Prescribed in Order No. R5-2010-XXXX [NPDES Permit No. CA0077682] (Sept. 3, 2010) (September Tentative TSO).) Regional Board staff also released for comments so-called potential permitting options or alternatives, consisting of alternative permitting approaches on certain key issues. These alternatives identified different outcomes than the staff-recommended September Tentative Permit on certain issues. (September 3 Tentative Permitting Options, Sacramento Regional County Sanitation District, Sacramento Regional Wastewater Treatment Plant (September Permitting Options).)[8]

The District[9] submitted a letter providing comments and evidence on the September Tentative Permit and September Tentative TSO. (Sacramento Regional County Sanitation District's Comments and Evidence Regarding Tentative NPDES Permit, Time Schedule Order, and Permitting Options Circulated on September 3, 2010 (Oct. 11, 2010) (hereafter, District's October 2010 Comments and Evidence Letter).) The District also supplied documentary evidence. Finally, the District submitted written testimony/comments prepared by nine individuals. Material prepared by these individuals was incorporated into the District's comments.[10] (All of these materials supplement information provided to Regional Board staff prior to the comment period and prior to issuance of the September Tentative Permit.)

On November 24, 2010, Regional Board staff released a revised tentative permit and revised tentative TSO and other materials[11] for consideration by the Regional Board or a Regional

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[8] These documents, and a notice of public hearing, accompanied a letter dated September 3, 2010, from James D. Marshall, P.E., Senior Engineer of Regional Board staff.

[9] Numerous other parties requested, and were ultimately granted, designated party status in accordance with Title 23 of the California Code of Regulations, sections 648(b) and 648.1(a). These parties included numerous agencies who are contractors for water exported from the Delta and an organization representative of contractors (collectively, Water Agencies), the Central Valley Clean Water Association, California Sportfishing Protection Alliance, North State Building Industry Association, and Campbell Soup Company.

[10] See District's October 2010 Comments and Evidence Letter, pp. 146-147.

[11] The documents referenced here are accessible at: www.waterboards.ca.gov/centralvalley/board_decisions/tentative_orders/1012/index.shtml#6 (as of Jan. 10, 2011).

Board panel at a December 9-10 meeting. Relevant here, the materials included: Staff Report, Sacramento Regional County Sanitation District, Sacramento Regional Wastewater Treatment Plant, Proposed NPDES Permit Renewal and Time Schedule Order, Sacramento County (Staff Report); a revised tentative permit reflecting staff's proposal (California Regional Water Quality Control Board, Central Valley Region, Order No. R5-2010-XXXX [NPDES No. CA0077682] Waste Discharge Requirements for the Sacramento Regional County Sanitation District, Sacramento Regional Wastewater Treatment Plant, Sacramento County (November Tentative Permit)); an "Underline/Strikeout" version of the November Tentative Permit, reflecting changes that had been made to the September Tentative Permit in creating the November Tentative Permit (California Regional Water Quality Control Board, Central Valley Region, Order No. R5-2010-XXXX [NPDES No. CA0077682] Waste Discharge Requirements for the Sacramento Regional County Sanitation District, Sacramento Regional Wastewater Treatment Plant, Sacramento County (November Redline Tentative Permit))[12]; a revised TSO representing staff's proposal (California Regional Water Quality Control Board, Central Valley Region, Time Schedule Order No. R5-2010-XXXX Requiring the Sacramento Regional County Sanitation District, Sacramento County, to Comply with Requirements Prescribed in Order No. R5-2010-XXXX [NPDES Permit No. CA0077682] (November Tentative TSO)); an "Underline/Strikeout" version of the November Tentative TSO, reflecting changes that had been made to the September Tentative TSO in creating the November Tentative TSO (California Regional Water Quality Control Board, Central Valley Region, Time Schedule Order No. R5-2010-XXXX Requiring the Sacramento Regional County Sanitation District, Sacramento County, to Comply with Requirements Prescribed in Order No. R5-2010-XXXX [NPDES Permit No. CA0077682] (November Redline Tentative TSO)); revised versions of the September

[12] The discussion in this Statement of Points and Authorities includes several citations to the November Redline Tentative Permit. For the State Board's information, the November Redline Tentative Permit includes certain duplicate or triplicate numbering of pages. In some cases, there is also a higher-numbered page preceding a lower-numbered page. In these circumstances, the relevant pages are normally proximate to one another. But in reviewing a citation to the November Redline Tentative Permit it is appropriate to ascertain whether there is more than one page with the cited page number.

Permitting Options; and Staff Response to Comments (i.e., response to comments received on September Tentative Permit and September Tentative TSO).

On December 8, 2010, Regional Board staff released its proposed "Late Revisions" to the November Tentative Permit.[13]

The 2010 renewal of the Permit occurred ten years after the previous renewal, a period that is longer than typical for NPDES permits in the region. At the same time, the District submits, the renewal was characterized by haste, particularly as related to major issues that are subjects of this Petition. An overriding objective became the adoption of the renewal permit in 2010. The September Tentative Permit and September Tentative TSO provided the first specific indication of staff's recommended action on key issues. There were important oversights, omissions, and inconsistencies in those tentative orders, many identified below and in District comments. The District and others generated and submitted a considerable volume of comments and other material in the five-week comment period ending October 11, 2010.

As discussed above, Regional Board staff issued the revised November Tentative Permit and revised November Tentative TSO and Staff Response to Comments, which were distributed on November 24, 2010. As discussed below, the Staff Response to Comments did not address numerous substantive comments and issues in any way. This concern is not merely technical. The District believes that measured consideration of all comments, and reflection on the issues raised by those comments, is an important part of the process. If time did not allow this, the pace was too hurried. Additionally, significant revisions occurred in the November materials, particularly in regard to areas of greatest concern to the District. For example, there were significant changes made in the Fact Sheet related to proposed tertiary filtration requirements.[14] New rationales were proposed for the denial of mixing zones, including for ammonia and nitrate, and there were substantial revisions in the technical discussion of ammonia-related issues.[15] The

[13] These December 8, 2010, late revisions are also available at the web address cited in footnote 11 for materials released on November 24.

[14] See November Redline Tentative Permit, pp. F-77 to F-78, F-80, F-81, F-77 to F-79.

[15] See November Redline Tentative Permit, pp. F-34 to F-37, F-40 to F-41, F-45 to F-46, J-3, J-6 to J-8.

September Tentative TSO was revised to include a new time schedule order for chlorpyrifos and diazinon (related to changes in the Tentative Permit regarding the same).[16] Ultimately, this meant that the Regional Board adopted a time schedule order for these constituents on 15-days notice. The District believes it would have been appropriate to re-circulate the November Tentative Permit and November Tentative TSO for comment on the changed provisions, but this did not occur.

The Regional Board conducted a hearing on December 9, 2010, which included testimony of designated parties and statements of many interested persons.[17] As discussed above, Regional Board staff had identified certain permitting alternatives or "options" that the Regional Board could consider (although the staff did not recommend any of these alternatives). The deliberation at the end of the hearing involved no discussion of any of these alternatives; nor did it include a discussion of any of the issues on which the District had presented testimony. The five Board members approved the November Tentative Permit with Late Revisions and certain other revisions recommended by staff at the hearing, as well as the TSO.[18]

III. REQUEST FOR CONSIDERATION OF SUPPLEMENTAL EVIDENCE

A. Scope of the District's Request For Consideration of Supplemental Evidence

In accordance with section 2050.6 of Title 23 of the California Code of Regulations, the District requests that the State Board take official notice of, and consider.[19]

Exhibit C hereto: Memorandum to David Coupe, Senior Staff Counsel, Central Valley Regional Water Quality Control Board, from Paul S. Simmons and Theresa A. Dunham, dated December 9, 2010, re: Sacramento Regional County Sanitation District Comments and Evidence

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[16] See November Redline Tentative Permit, pp. F-71 to F-72; November Redline Tentative TSO, pp. 1-2, 5.

[17] The District understands that statements by interested persons are considered non-evidentiary. (See, e.g., Cal. Code Regs., tit. 23, § 648.1(d).) The District notes, however, that there were certain statements of interested persons that are not accurate. These include, but are by no means limited to, representations concerning the costs for service borne by District customers versus persons in other areas of the state, and concerning analyses of economic impacts to the region.

[18] Hearing Transcript, pp. 462:13-463:9.

[19] To the extent a request is necessary, the District requests the State Board take official notice of the orders of the State Board and Regional Board cited herein, in accordance with section 648.2 of Title 23 of the California Code of Regulations.

Provided to Central Valley Regional Water Quality Control Board (Central Valley Water Board) and Lack of Response to Certain Comments.

B. Support For the Request

The State Board should grant the District's request. Consideration of the document causes no prejudice or unfairness to the Regional Board.

The memorandum provided as Exhibit C was delivered to the Regional Board and parties on December 9, 2010, and the District requested that it be included in the record. The request was denied.[20]

The document in question identified certain deficiencies in the Staff Response to Comments. Federal regulations require that a response to comments "[b]riefly describe and respond to all significant comments on the draft permit . . . raised during the public comment period[.]"[21] The Staff Response to Comments does not comply with this obligation. The attached memorandum does not necessarily identify each and every significant comment to which there was no response. In addition, there are comments discussed below to which there was no response. The District also emphasizes a significant issue identified in the subject memorandum. As discussed, the District submitted written testimony/comments of numerous individuals. The District, in its October 2010 Comments and Evidence Letter, and as reflected on pages 11-12 of Exhibit C, stated:

> We enclose documents completed by numerous individuals identified as testimony or comment (or both). Owing to the limitations on time to respond to the [September] Tentative Permit, the immediately preceding materials do not necessarily include all of the content of each of these individuals' testimony/comment. Accordingly, all of such material is incorporated by reference as part of the District's comments.[22]

The State Board will find that the Staff Response to Comments addresses none of this material.

[20] Hearing Transcript, pp. 5:19-6:24.

[21] 40 C.F.R. § 124.17(a)(2).

[22] District's October 2010 Comments and Evidence Letter, p. 146.

It appears that the principal reason that Exhibit C was not admitted to the record is that it was delivered only on the morning of the Regional Board hearing.[23] The District acknowledges that it delivered the memorandum at such time. However, this is immaterial. The District did not insist that the Regional Board accept all of the statements in the memorandum as true. Nor did the District insist that the Regional Board not proceed with the hearing. The State Board should also consider that the District and others received a considerable volume of material on November 24, 2010, including a revised tentative permit. As that was the day immediately before Thanksgiving, the date was functionally equivalent to Monday, November 29, 2010, the week immediately preceding the hearing. It is more than understandable that the District was focused on other matters during that week. Finally, the District did not even know there would *be* a Regional Board hearing until December 8, 2010, the day before the hearing.[24]

Further, the District does not ask that the State Board remand the entire matter to the Regional Board simply because of noncompliance with the obligation to respond to comments. The District does, however, believe that the comments all merit consideration as part of the State Board's review.

Finally, if the State Board denies the request, the memorandum at Exhibit C is hereby incorporated by reference as part of this Petition and the Statement of Points and Authorities here provided.

IV. COST CONSIDERATIONS

The Permit references various estimates pertaining to the cost of compliance with Permit provisions. Cost is relevant for several reasons. It is relevant to the Regional Board's overall obligation to act reasonably under Water Code sections 13000 and 13001. Cost is relevant to the Permit requirements for tertiary filtration under Water Code section 13241.[25] It is relevant to

[23] See Hearing Transcript, pp. 5:19-24, 6:3-11.

[24] It was not announced until December 8, 2010, that a sufficient number of Regional Board members would be in office to constitute a quorum. Had there not been a hearing of the Regional Board, Exhibit C would not have been completed by December 9, 2010.

[25] See section V, below.

decisions to grant or deny mixing zones.[26] To the extent State Board Resolution No. 68-16, *Statement of Policy With Respect to Maintaining High Quality Waters in California*, applies, cost and impacts to the community are relevant to that analysis.[27] These examples are not exclusive. Because of the overriding nature of this issue, the cost of compliance is discussed here.

The three largest drivers of Permit compliance cost (setting aside potential liabilities) are ammonia removal (nitrification), nitrate removal (denitrification), and filtration for pathogen reduction and related requirements. The best available estimate of the cost of compliance with these terms is over **$2 billion**. With that said, any estimate of costs referenced in the Permit materials is a staggering number that would have major adverse consequences for individuals and the region.

Steve McDonald and Carollo Engineers (Carollo) provided analysis with respect to foreseeable costs of compliance. Carollo, and Mr. McDonald specifically, have decades of site-specific knowledge and experience with respect to the SRWTP. In addition, they have broad experience with wastewater design, construction, and cost estimation, and Mr. McDonald has been the lead engineer for publicly owned treatment works (POTWs) serving approximately one-third of the population of Northern California.[28]

Carollo prepared various reports and analyses regarding treatment alternatives and costs for the SRWTP, including costs of implementing technologies and compliance with potential permit terms.[29] Among these, and a product that also updated and incorporated results of prior work,[30] was a Technical Memorandum Prepared in March 2009, titled, "Advanced Treatment

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[26] See sections VI, VII, IX, below.

[27] See section VIII, below.

[28] Sacramento Regional Wastewater Treatment Plant NPDES Permit Renewal, [Written] Testimony/Comments of Hugh Stephen McDonald, Carollo Engineers on the Costs of Treatment and Feasibility of Complying With Certain Effluent Limitations Proposed in Waste Discharge Requirements for the Sacramento Regional County Sanitation District, Sacramento Regional Wastewater Treatment Plant (McDonald Written Testimony), p. 1 and Exhibit A; Hearing Transcript, p. 168:8-22; SRCSD Hearing Exhibits, PowerPoint slide 4.

[29] McDonald Written Testimony, pp. 1-3; Hearing Transcript, pp. 168:23-169:15.

[30] McDonald Written Testimony, pp. 3-4.

Alternatives for the SRWTP" (2009 Treatment Alternatives Technical Memo).[31] The 2009 Treatment Alternatives Technical Memo evaluated five different treatment "trains" that could be applicable in different scenarios, depending on potential future requirements that could be imposed, and their cost.[32] The 2009 Treatment Alternatives Technical Memo was based on an assumed permitted flow of 218 mgd ADWF. Accordingly, in August 2010 (subsequent to the District's withdrawal of its request for increased permitted flow), Carollo modified the cost estimates to be consistent with a permitted flow of 181 mgd.[33]

The Permit requires full nitrification for ammonia removal, denitrification for nitrate removal, and filtration. The applicable[34] treatment train developed by Carollo is a treatment train involving:

a. Microfiltration and disinfection to meet filtration requirements. The planning level estimate of project costs is $1.2 billion if existing chlorine disinfection is used, and $1.3 billion if ultraviolet disinfection (UV) is used. The planning level estimate of increased operation and maintenance (O&M) costs is $44 million per year (if chlorine is used) and $46 million (if UV is used).[35]

b. Nitrifying trickling filters (NTF) for ammonia removal. The planning level estimated project cost is $580 million, and the increased annual O&M cost is $15 million per year.[36] There is, however, uncertainty as to whether NTFs alone would ensure compliance with the daily maximum effluent limitations for ammonia in the Permit, and thus the cost may be

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[31] This document is included within a larger document in the record titled, "Analysis of Costs and Benefits of Advanced Treatment Alternatives for the Sacramento Regional Wastewater Treatment Plant," completed by Larry Walker Associates. (See McDonald Written Testimony, p. 1.)

[32] McDonald Written Testimony, pp. 3-4; Hearing Transcript, p. 169:4-15.

[33] See McDonald Written Testimony, p. 4. The August 19, 2010, project memorandum is titled, "Modification of Flow basis for treatment train costs as previously presented in the 'Advanced Treatment Alternatives for the Sacramento Regional Wastewater Treatment Plant' " (Carollo, March 2009). It was supplemented by a memorandum of August 25, 2010, titled, "Clarification of base construction costs and construction cost factors as presented in the 'Advanced Treatment Alternatives for the Sacramento Regional Wastewater Treatment Plant' " (Carollo, March 2009), and other work described in testimony.

[34] Technical analyses are presented in the various reports and testimony.

[35] McDonald Written Testimony, p. 5; Hearing Transcript, p. 172:8-16.

[36] McDonald Written Testimony, p. 5.

greater.[37] Also, the Permit as adopted creates the potential that the District would be required to implement "interim" ammonia reduction.[38] There has been no evaluation of potential added (or stranded) costs associated with meeting revised interim ammonia limits that could arise under the Permit.[39]

c. NTFs followed by Fluidized Bed Reactors (FBR) to meet nitrate limitations. The planning level project cost is $780 million, with increased annual O&M costs of approximately $31 million per year.[40]

The Permit does not make any specific findings related to what the cost of compliance will likely be, whether capital or annual operation and maintenance costs. The Permit and related staff documents do refer to other evaluations that were conducted.[41] Specifically, PG Environmental, a permitting compliance firm engaged by the Regional Board, prepared two memoranda concerning the Carollo work,[42] and a firm retained by the Water Agencies prepared a memorandum and a letter.[43] In general, the differences in all the planning level costs provided for nitrification and denitrification are minor. Indeed, as explained by Mr. McDonald, if put on the

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[37] McDonald Written Testimony, p. 5; Hearing Transcript, pp. 169:25-170:2; [Written] Testimony/Comments of Denny S. Parker Related to Draft Waste Discharge Requirements for the Sacramento Regional Wastewater Treatment Plant Tentative Order of the California Regional Water Quality Control Board, Central Valley Region, September 3, 2010 (Parker Written Testimony), p. 5.

[38] Permit, p. 26.

[39] Hearing Transcript, p. 170:2-3; SRCSD Hearing Exhibits, PowerPoint slide 8.

[40] McDonald Written Testimony, p. 5. Note that these "denitrification" costs also include the nitrification cost for ammonia removal represented by the NTFs. In addition, Mr. McDonald's written testimony states that this technology would not meet proposed nitrate effluent limits. (McDonald Written Testimony, p. 5.) At the time of preparation of the testimony, proposed nitrate limits (in the September Tentative Permit) were extraordinarily low and unprecedented. The proposed limit was revised in the November Tentative Permit and the Permit as adopted, and the identified technology could comply with the Permit limits. (Hearing Transcript, p. 169:20-25.)

[41] Permit, pp. F-79, F-97; Staff Response to Comments, pp. 5-10; Staff Report, pp. 38-40.

[42] Memorandum to Kathleen Harder, Central Valley Regional Water Board, from PG Environmental, LLC, subject: Technical Review of Estimated Costs for Proposed Changes to the Sacramento Regional Wastewater Treatment Plant (August 13, 2010); Memorandum to Kathleen Harder, Central Valley Regional Water Board, from PG Environmental, LLC, Subject: Technical Review of Estimated Costs for Proposed Changes to the Sacramento Regional Wastewater Treatment Plant (August 18, 2010).

[43] Technical Memorandum, Trussell Technologies, Ammonia Removal Cost Alternatives for the Sacramento Regional Wastewater Treatment Plant (May 31, 2010); Letter to Adam Kear, Senior Deputy General Counsel, Metropolitan Water District of Southern California, from R. Shane Trussell, re: Summary of Preliminary Findings in the Response to the Tentative SRCSD NPDES Permit (Trussell October 1 Letter).

same cost estimating basis as Carollo, the Water Agency's planning level project estimate for nitrification and denitrification is greater than Carollo's.[44]

Somewhat greater differences appear in regard to filtration. In his written testimony and accompanying exhibits, Mr. McDonald addressed in detail the limitations of the PG Environmental work.[45] It is not clear whether Regional Board staff read this material. Among other things, it explains the selection of microfiltration instead of other filtration technology as the appropriate technology choice for the SRWTP at this stage of planning, a choice also made by the Water Agencies' consultant.[46] Mr. McDonald also, again, described the need to put cost estimates on a common, apples-to-apples basis, justified the estimating assumptions used by Carollo, and explained that if put on a common basis, the Water Agencies' project cost for microfiltration would be $722 million as compared to Carollo's $1.25 billion.[47] While differences in these costs are within the accuracy of the "level 5" planning estimates, Mr. McDonald also explained in detail the reasons the Carollo microfiltration estimate was more applicable to the SRWTP.[48]

Mr. McDonald acknowledged, as does the District, that further engineering and pilot testing would be required to refine Carollo's cost estimates, but they are appropriate for master planning.[49] The estimates should have been considered specifically in development of the Permit.[50] As noted previously, no estimate of costs exists that does not represent an extremely large expenditure with real impacts.

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[44] Hearing Transcript, pp. 170:10-174:14.

[45] McDonald Written Testimony, pp. 5-8 and attached Exhibits C and D thereto.

[46] McDonald Written Testimony, pp. 5-8 and attached Exhibits C and D thereto; Hearing Transcript, p. 170:4-8; SRCSD Hearing Exhibits, PowerPoint slide 8.

[47] Hearing Transcript, pp. 170:10-172:16, 177:23-179:11, 181:17-182:9; SRCSD Hearing Exhibits, PowerPoint slides 9-10.

[48] Hearing Transcript, pp. 172:17-174:11.

[49] McDonald Written Testimony, p. 5; Hearing Transcript, pp. 170:6-8, 174:12-14.

[50] As noted above, the Permit does not make specific findings as to the costs to comply with the Permit terms. However, as the District indicated at the Regional Board hearing, the District takes exception to certain discussion of this issue in other documents generated by Regional Board staff, such as the Staff Response to Comments document. These materials purport to provide critical review of certain District or Carollo analyses. Such assertions are not well-informed, ignore completely the content of Mr. McDonald's written testimony, and identify issues that were addressed with Regional Board staff previously. (See, e.g., email memorandum, August 10, 2010, from Vyomini

The costs of compliance have consequences for individual citizens and the region as a whole. Based on the anticipated costs, the District calculated an increase for the monthly residential charge for wastewater treatment increasing from $20 to $61.50.[51] (These charges exclude separate monthly charges for sewer collection services.) The District calculated a rise in impact fees for households from $7,450 to $35,000.[52] Costs for business will also of course increase similarly.[53]

The Permit and related documents make various, and sometimes internally contradictory arguments, related to the importance of cost. On the one hand, it is stated that "many" communities discharging to surface water pay more, and on the other hand it is stated that other municipalities have implemented technologies that the Permit would require, but pay less.[54] There are numerous problems with this approach and the philosophy it suggests. Most obviously, of course, comparisons are meaningless unless they compare "apples to apples." A simple example discussed above is that customers of the District pay separate charges for treatment and collection. This may or may not be true for others. Also, "many" is a vague statement. However, there are many dischargers in the region (or any given geographic area) not mentioned in the Permit whose customers pay *less*; the District does not suggest that, for that reason, the District's customers should also pay less.

Pandya, to Kathleen Harder, Subject: Questions from review of Cost Benefit Analysis.) In the meantime, the staff materials provide no examination of other cost estimates. Mr. McDonald's written testimony addresses limitations of PG Environmental's memoranda. (See McDonald Written Testimony, pp. 5-8 and Exhibits C and D thereto.) There is no indication this testimony was even reviewed. The District also notes by way of example the very cursory discussion of costs of microfiltration in the Trussell October 1 Letter. (See Trussell October 1 Letter, pp. 3-4.) (The District notes that the Hearing Transcript refers to this letter as referencing "several" projects, but it refers to two. [Hearing Transcript, p. 172:19-22; Trussell October 1 Letter, pp. 3-4; see also SRCSD Hearing Exhibits, PowerPoint slide 11.].)

[51] See Hearing Transcript, p. 223:3-6 and SRCSD Hearing Exhibits, PowerPoint slide 44; see also District's October 2010 Comments and Evidence Letter, pp. 64, 88.

[52] SRCSD Hearing Exhibits, PowerPoint slide 44; see District's October 2010 Comments and Evidence Letter, pp. 64, 88

[53] Hearing Transcript, p. 223:1-6; SRCSD Hearing Exhibits, PowerPoint slide 44; District's October 2010 Comments and Evidence Letter, pp. 64, 88. The specific allocation of costs among existing and new users must of course be approved by the District's Board of Directors based on a rate and fee study. The topic of allocation among classes of customers was discussed at the hearing, but the total costs must be paid by the District's customers in any circumstance.

[54] See, e.g., Permit, p. F-97.

With respect to the comparison to cities such as Lodi, Manteca, Stockton, and Tracy (which the Permit cites as possible reasons ratepayer costs might not equal those calculated by the District), Mr. Dean, the District Engineer, capably addressed the superficiality of such comparisons:

> And I think these comparisons with others are extremely shallow. Our translation of costs to rates and fees is based on a ten-year look ahead and a reasonable financing plan. This is the period that's needed to build major infrastructure.
>
> Many of the numbers sited [sic] for other rates and fees are different for possibly a wide range of reasons. A true comparison must address several other factors. How much of those other plants was actually funded by development when it was in its hay day? Don't know.
>
> How much was funded by grants? Many of the other plants did get grants to help the situations, but we have not done as [sic] analysis of how much grant money was in the comparisons before us today.
>
> How much of the cities do not accurately apportion their costs between wastewater utility and other general funds in the cities? There may be disparities there.
>
> What are the unfunded liabilities with these other utilities? Are they keeping up the infrastructure and doing the maintenance and rehab? Or are some of these folks sitting on giant time bombs with their infrastructure that need to be funded down the road. We don't know. We know this is a huge problem with utilities across the United States.
>
> And we have to talk about the quality and longevity of the projects that were constructed. Until we answer those questions, I find comparison to other utilities a very hollow argument.[55]

More generally, the Permit's ubiquitous theme is that because some other municipal dischargers employ certain treatment technology, the District should too, and the costs will simply be whatever they are. This is entirely inappropriate, and a shirking of the Regional Board's responsibility. It is not the right approach, and not good government.

In fact, the Permit carefully selected certain municipalities and described expensive treatment technologies that have been required of those agencies.[56] There are inaccuracies and misleading statements in some of the information, discussed later. But more fundamentally, the approach to regulation of POTWs has included, and should include, development of water

[55] Hearing Transcript, pp. 224:4-225:7. The District also notes that the Permit states that other cities have constructed advanced treatment "and have not suffered significant adverse economic impacts as a result of these upgrades." (Permit, p. F-97.) The District is unaware of any analysis or other evidence that would support such a conclusion.

[56] See, e.g., Permit, p. F-96.

quality-based effluent limitations based on the applicable water quality standards and the specific receiving water circumstances.

As the State Board knows, many agencies are dischargers to effluent dominated waters (EDWs) or otherwise where there is limited dilution in the immediate receiving water, and not at all similarly situated to the District. This includes dischargers within the statutory boundaries of the Delta, for example. The Permit is extraordinarily misleading by its failure to address why certain other permits include the requirements that drive the permittees to employ certain treatment technologies. The District believes the technology-based and water quality-based permitting *approach* for the District should be the same as for other dischargers, and applicable standards and the law should guide the outcome. The District does *not* believe the *outcome* must be the same for an ocean discharger as for a discharger to the Delta. Nor does the District believe the *outcome* for the District must be the same as for a given EDW or any other discharger. Applying these principles, the appropriate outcome for the District is consistent with the specific requested actions of the State Board described in paragraph 6 of this Petition above.

The Permit would vastly increase the wastewater utility rates paid by all residents. The Permit's approach to this issue is ultimately cavalier: as long as someone elsewhere pays a given amount, there is no reason the Sacramento region's citizens should not do the same. That residents of some areas pay more than residents of other areas for wastewater utility service is not a reason, above all in these economic times, simply to raise the costs for the Sacramento region. If there is to be a policy to prescribe uniform treatment requirements across the state, or to equalize the cost of wastewater utility service throughout the state (or the cost of other essential public services), that policy should be developed and explained. Failing that, the District should be regulated based on the law, specific circumstances, sound science, and reason.

V. THE PERMIT'S NEW FILTRATION REQUIREMENTS ARE NOT JUSTIFIED

The District objects to, and requests changes to, the Permit's final effluent limitations for total coliform organisms (Permit § IV.A.1.g) and the related final effluent limitations for BOD and TSS (Permit § IV.A.1.a [Table 6]) and "operation" specifications for turbidity (Permit § VI.C.4.a) (all collectively referred to as "filtration" or "tertiary" requirements). The Permit's

total coliform requirements (2.2 Most Probable Number [MPN] per 100 mL as a 7-day median, and as otherwise specified in the Permit) are based on Department of Public Health (DPH) "Title 22" regulations that prescribe effluent quality for certain uses of recycled water "that has been transported from the point of treatment or production to the point of use without an intervening discharge to waters of the State."[57] Specifically, under DPH regulations, the "2.2 MPN" requirement applies where effluent is used directly for irrigation of "food crops," impoundments of recycled water for unrestricted recreation, and certain other uses.[58] The new Permit limitations for BOD, TSS, and turbidity are coupled with the new total coliform requirements, and represent limits that can be achieved with filtration technology.[59]

In adopting the filtration requirements in the Permit, the Regional Board: departed from its own precedent; employed an unreasonable standard; made findings that are inconsistent with the Water Code or are completely without evidentiary support (or both); misconstrued or mischaracterized evidence; ignored relevant evidence altogether; and failed to respond to comments submitted by the District.

Order No. 5-00-188, the District's predecessor permit, contained effluent limitations for disinfection/pathogens as follows: 23 MPN/100mL as a median weekly average and 500 MPN/100mL as a daily maximum not to be exceeded in any consecutive two days.[60] Limitations for BOD and TSS in Order No. 5-00-188 were based on applicable requirements of the Clean Water Act (CWA).[61] The previous limits for total coliform, BOD, and TSS are adequate and appropriate. The State Board should determine that the Permit's filtration

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[57] Cal. Code Regs., tit. 22, § 60301.200.

[58] Cal. Code Regs., tit. 22, §§ 60301.220, 60304(a)(1), (b), 60305.

[59] As characterized in the Permit, the new BOD and TSS requirements are "based on tertiary treatment." (Permit, p. F-17.) The turbidity specification is also based on the capabilities of tertiary filtration. (Permit, pp. F-78 to F-79.) All of the described filtration requirements are subject to the Permit Compliance Schedule. (Permit, pp. 30, 33; see also, Staff Report, p. 29, Table 8 [tertiary requirements include BOD, TSS, total coliform, and turbidity].) The Permit generally refers to all of these provisions collectively as "tertiary treatment" or "tertiary filtration."

[60] Order No. 5-00-188, pp. 13-14 and fn. 4.

[61] See Order No. 5-00-188, p. 13. The regulations implementing the CWA require effluent quality for BOD and TSS of 30 mg/L as a 30-day average. (40 C.F.R. § 133.102.) The actual performance of the SRWTP is significantly superior to the CWA "30-30" requirements for BOD and TSS. (See Permit, p. F-6 [Table F-2].)

requirements are improper. The Regional Board staff prepared a "Disinfection Alternative 1" based on 23 MPN/100 mL, with BOD and TSS limits based on CWA requirements.[62] The State Board should order that final effluent limitations for coliform, BOD, and TSS shall be those provided in Disinfection Alternative 1. Those limitations are identified in paragraph 6.B.ii of the District's Petition immediately preceding this Statement of Points and Authorities.

A. The Regional Board Did Not Conduct a Reasonable Potential Analysis

On pages F-72 through F-74, the Permit findings purport to conduct a "reasonable potential" analysis for pathogens based on a water quality objective or "WQO." On page F-78, the Permit includes a heading "WQBEL"; i.e., "water quality-based effluent limitation." In various locations, the Permit characterizes the filtration requirements as WQBELs.[63] However, the Permit is not based on any discernible water quality-based permitting analysis. As described in the Permit itself, the process of establishing WQBELs involves determination of whether the discharge is likely to cause or contribute to exceedances of a numeric or narrative WQO or water quality criterion and, if so, establishing effluent limitations to implement the standard.[64] Nowhere does the Permit identify a WQO or any actual results of a reasonable potential analysis associated with the filtration requirements in the Permit. Instead, the Permit contains only inaccurate and argumentative statements advocating tertiary filtration as a level of treatment.

The applicable Basin Plan WQO for pathogens in the Sacramento River is as follows:

> In waters designated for contact recreation (REC-1), the fecal coliform concentration based on a minimum of not less than five samples for any 30-day period shall not exceed a geometric mean of 200/100 ml, nor shall more than ten percent of the total number of samples taken during any 30-day period exceed 400/100 ml.[65]

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[62] See Disinfection Alternative No. 1, Sacramento County Sanitation District [sic], Sacramento Regional Wastewater Treatment Plant, Proposed Waste Discharge Requirements and Time Schedule Order (NPDES No. CA0077682); Regional Water Quality Control Board, Central Valley Region Board Meeting – 9 December 2010, Item #6 (document distributed November 24, 2010), p. 3. The interim effluent limitations under the Permit are similar, but not identical to, Disinfection Alternative 1. (See Permit, section IV.A.2.a [Table 7] and section IV.A.2.c.)

[63] See, e.g., Permit, pp. F-77, F-78 to F-79, F-80, F-97.

[64] Permit, pp. 6, F-15; see also *In the Matter of Own Motion Review of Waste Discharge Requirements for the University of California, Davis*, Order No. WQ 2010-0005 (March 16, 2010), pp. 9-10.

[65] *Water Quality Control Plan for the Sacramento River and San Joaquin River Basin*, 4th ed. (Rev. Sept. 2009) (Basin Plan), p. III-3.00.

Section IV.C.3.d.xx(a) of the Permit Fact Sheet[66] purports to address the pathogens "WQO," but does not mention this WQO or *any* WQO at all. The section merely states that the Regional Board desires to require "an equivalent level of treatment" to the level that applies for unrestricted re-use of water.[67] "2.2 MPN," for example, is not a WQO for the Sacramento River. Nor does the Regional Board find that 2.2 MPN is a WQO "reasonably required" to protect beneficial uses of the lower Sacramento River and Delta[68] or a water quality condition "that could reasonably be achieved"[69] in ambient waters. Similarly, the "RPA Results" section related to pathogens[70] does not consider whether the discharge has reasonable potential to cause or contribute to exceedances of a WQO. The "RPA Results" section is only, again, a superficial argument for the level of treatment applicable to certain direct re-use. As discussed above, the DPH regulations prescribe effluent quality for "use of recycled water that has been transported from the point of treatment or production to the point of use *without an intervening discharge to waters of the State*."[71] There is no such use here. Setting aside the lack of direct use, the Permit does not acknowledge that there are other Title 22 reclamation criteria, including 23 MPN per 100 mL, applicable to specific uses.[72] Instead, it implies that the only Title 22 criteria that exist are the requirements for tertiary effluent, which apply to recycled water that comes into direct contact with "food crops" or is impounded for unrestricted recreation.[73] In the instant case, these circumstances are not present or remotely close to present. The reclamation regulations thus have no application or relevance here. In summary, the Permit does not present any analysis to support a WQBEL implementing any discernible WQO.

[66] Permit, pp. F-72 to F-73.

[67] Permit, p. F-73.

[68] Wat. Code, § 13263(a).

[69] Wat. Code, § 13241(c).

[70] Permit, pp. F-73 to F-78.

[71] Cal. Code Regs., tit. 22, § 60301.200, emphasis added.

[72] See, e.g., Cal. Code Regs., tit. 22, §§ 60304(b) & (d), 60301.225.

[73] Cal. Code Regs., tit. 22, §§ 60304(a)(1), 60305.

The District, in its October 2010 Comments and Evidence Letter, pointed out the above deficiencies in the pathogens discussion under the headings "WQO," "RPA Results," and "WQBELs."[74] The Staff Response to Comments furnishes no direct response to the District's comments on these issues.

B. The Regional Board Ignored, Then Re-characterized, Its Typical "20:1" Practice in Order to Reach an Outcome

In a letter to the Regional Board dated April 8, 1999, DPH indicated it would consider wastewater discharged to water bodies with identified beneficial uses of irrigation or contact recreation and where the wastewater receives dilution of more than 20:1 to be adequately disinfected if the effluent coliform concentration does not exceed 23 MPN/100 mL as a 7-day median and effluent coliform concentration does not exceed 240 MPN/100 mL more than once in any 30-day period. DPH reiterated this advice in a letter dated July 1, 2003: "A filtered and disinfected effluent should be required in situations where critical beneficial uses (i.e., food crop irrigation or body contact recreation) are made of the receiving waters unless a 20:1 dilution ratio (DR) is available. In these circumstances, a secondary, 23 MPN discharge is acceptable . . . . For wastewater discharges into streams that experience tidal influences an instantaneous DR of less than 20:1 is acceptable as long as the average for each day exceeds 20:1."[75]

Daily dilution of the SRWTP effluent is always greater than 20:1, and ordinarily it is considerably greater. It is not disputed that the average dilution of the SRWTP effluent is over 50:1.[76] Further, had the District been discharging at its *full* permitted flow during the period

[74] District's 2010 October Comments and Evidence Letter, p. 7. The District does not dispute that the Regional Board *can* in appropriate circumstances issue WQBELs, including WQBELs more stringent than necessary to implement an adopted WQO. This requires compliance with Water Code §§ 13263(a) and 13241, a subject discussed below. The September Tentative Permit did not include any discussion of findings under these Water Code provisions.

[75] Letter dated July 1, 2003, to Thomas R. Pinkos, Executive Officer, RWQCB, from David P. Spath, Chief, Division of Drinking Water and Environmental Management.

[76] See Staff Report, p. 30; see also District's October 2010 Comments and Evidence Letter, pp. 8, 12; Permit, p. F-38.

January 1, 1998, through January 1, 2010, there would have been zero days with average dilution less than 20:1.[77]

The Regional Board routinely uses the 20:1 guideline or policy. For example, an NPDES permit issued last year states:

> In a letter to the Regional Water Board dated 8 April 1999, DPH indicated it would consider wastewater discharged to water bodies with identified beneficial uses of irrigation or contact recreation and where the wastewater receives dilution of more than 20:1 to be adequately disinfected if the effluent coliform concentration does not exceed 23 MPN/100 mL as a 7-day median and if the effluent coliform concentration does not exceed 240 MPN/100 mL more than once in any 30 day period. In a subsequent letter dated 1 July 2003, DPH states that a "filtered and disinfected effluent should be required in situations where critical beneficial uses (i.e. food crop irrigation or body contact recreation) are made of the receiving waters unless a 20:1 dilution ratio is available. In these circumstances, a secondary, 23 MPN discharge is acceptable." DPH considers such discharges to be essentially pathogen-free.[78]

The September Tentative Permit did not even refer to the 20:1 dilution ratio guideline. To the District's knowledge, the lack of reference to t his guideline is unprecedented in at least the last decade. In its comments on the September Tentative Permit, the District identified this unequal treatment. The District also stated, and reiterates here:

> The Regional Board has conformed its permitting practice to the 20:1 guideline. The District has reviewed 56 recent Region 5 permits, including 22 from 2007, 19 from 2008, 10 from 2009, and 5 from 2010. A list of the reviewed permits is enclosed. Thirty-three permits found less than 20:1 dilution, and 18 found more than 20:1 dilution. Of the permits allowing less than 20:1 dilution, all contained total coliform effluent limits of 2.2 MPN/100 mL as a 7-day median. Of the 18 allowing more than 20:1 dilution, 16 contained total coliform effluent limits of 23 MPN/100 mL as a 7-day median (or higher). Two contained total coliform effluent limits of 2.2 MPN/100 mL as a 7-day median. In other words, 16 of 18 permits issued to similarly situated dischargers in the 2007-2010 period *did not* include the limits imposed here for coliform and related constituents.[79]

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[77] District's October 2010 Comments and Evidence Letter, p. 12. Certain other material in the record that refers to the probability of occurrence of less than 20:1 dilution is based on calculations assuming the once-requested, increased permitted flow of 218 mgd ADWF. The value cited above is based on 181 mgd ADWF.

[78] Order No. R5-2010-0019 (City of Chico), pp. F-27 to F-28.

· While the District believes the guideline or policy may be unnecessarily conservative and there are rulemaking considerations associated with the guideline, the present point is that the Permit is inconsistent with historic practice.

[79] A table summarizing this review was provided with the District's October 2010 Comments and Evidence Letter and is titled "List of Reviewed Region 5 Permits: Tertiary Coliform Limits and Available Dilution."

> The two exceptions involved different circumstances. The two permits imposing tertiary limits even though 20:1 dilution was available were for the City of Angels Wastewater Treatment Plant, Order No. R5-2007-0031 (NPDES No. CA0085201), and the Ironhouse Sanitary District Wastewater Treatment Plant, Order No. R5-2008-0057 (NPDES No. CA0085260). Importantly, in both of these instances, the publicly owned treatment works (POTW) itself was proposing to discharge Title 22 tertiary effluent. The City of Angels permit reflects that the City's own mitigated negative declaration required treatment equivalent to Title 22 tertiary. The Ironhouse Sanitary District's own Environmental Impact Report and antidegradation analysis for a new discharge were based on a Title 22 tertiary treatment facility.[80]

The Permit and related materials frequently refer to "large" dischargers in the Delta who have been required to install filtration, as an argument for the Permit filtration requirements.[81] In each of those cases, however, the receiving water was found not to provide 20:1 dilution of those discharges.[82] Those examples are irrelevant for that reason alone.

The revised November Tentative Permit and Permit as adopted, do at least acknowledge the 20:1 policy, characterizing it as a "rule of thumb" and not a regulation.[83] While the District agrees that the policy is not a regulation, the Permit improperly seeks to create distance between normal practice and this Permit.[84] In particular, the Permit selectively identifies POTW discharges to the Sacramento River downstream of Shasta Dam where dilution is much greater

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[80] District's October 2010 Comments and Evidence Letter, pp. 12-13, fn. * in original.

[81] Permit, p. F-9; see Staff Report, p. 40; Staff Response to Comments, pp. 5, 40.

[82] See Order No. R5-2008-0154 (City of Stockton), pp. 31, F-38 to F-39; Order No. R5-2007-0113 (City of Lodi), pp. 34, F-32 to F-33; Order No. R5-2009-0095 (City of Manteca), pp. 32, F-46 to F-47; Order No. R5-2007-0036 (City of Tracy), pp. 24, F-24, F-39 to F-40.

[83] See November Redline Tentative Permit, pp. F-77 to F-78; Permit, p. F-74.

[84] As discussed above, the District demonstrated that in 16 of 18 situations over a period in 2007-2010, the Regional Board did not require filtration where 20:1 dilution exists, and in the remaining 2 cases the dischargers proposed, and did not object to, filtration. Regional Board staff went back further in time, to 2005, and the Staff Report states that there is a grand total of two more situations where 20:1 dilution exists and the permit for the discharger provides for filtration. (Staff Report, p. 24.) Tellingly, there is no accounting provided related to the permits over the larger time period that do *not* require filtration. Moreover, the two other permits identified in the Staff Report do not appear to present analogous situations. The permit for the Bear Valley Wastewater Treatment Facility authorizes discharges to Bloods Creek and the Bear Valley Wastewater Storage Reservoir. (Order No. R5-2005-0139 (Bear Valley), pp. 1-2.) Discharge of effluent of 23 MPN may occur when the effluent receives 20:1 dilution and it is necessary to maintain design conditions in the reservoir. (Order No. R5-2005-0139, pp. 3, 16, 21.) Wastewater discharged to the *reservoir* is required to have tertiary treatment because discharges to an unnamed tributary of Bloods Creek "may occur with little or no dilution." (Resolution No. R5-2008-0141, p. 1, amending Order No. R5-2005-0139.) The City of Jackson permit reflects specific use of minimally diluted water in a trailer residential park drawing from the receiving stream and a lake downstream of the discharge. (Order No. R5-2007-0133 (City of Jackson), p. F-6.) Either of these permits may be more conservative than necessary, apparently were not challenged, and are not analogous in any event.

than 20:1, suggesting the real threshold is not 20:1 but some other, unstated value.[85] It is unsurprising that certain discharges to the Sacramento River downstream of Shasta Dam have very high levels of dilution. This does not mean that the policy is something *other* than 20:1 for the Sacramento River or anywhere else the policy applies. Indeed, there are examples of the Regional Board finding much lower levels of dilution than the selected examples now cited in the Permit, yet still not requiring filtration where 20:1 dilution exists.[86] In other words, "20:1" means 20:1, not some other number in terms of the dilution threshold employed by the Regional Board.

Ultimately, the Regional Board's only justification offered for deviating from normal practice revolves around an inaccurate and incomplete discussion of risk associated with the SRWTP discharge and failure to consider evidence or statutory requirements, addressed further below.

C. The Permit Mischaracterizes the Risk Assessment and Ignores Relevant Evidence Altogether

1. February 2010 Risk Assessment Report

While the 20:1 dilution policy remains highly relevant, it is correct that Regional Board staff also sought a recommendation from DPH with regard to disinfection.[87] Because

[85] See November Redline Tentative Permit, p. F-78; Permit, p. F-74.

[86] For recent examples, see, e.g., Order Nos. R5-2010-0073 (Sewerage Commission-Oroville); R5-2010-0019 (City of Chico); R5-2009-0078 (Chester Public Utility District); R5-2009-0007 (San Andreas Sanitary District); R5-2008-0179 (Town of Discovery Bay CSD); R5-2008-0162 (Tuolumne Utilities District); R5-2007-0134 (City of Yuba City); R5-2007-0098 (Tehama CSD #1); R5-2007-0069 (El Dorado Irrigation District); R5-2007-0056 (City of Mount Shasta). These specific examples and dilution levels recognized or allowed for each are also reflected in PowerPoint slide 29 of SRCSD's Hearing Exhibits. By way of closing statement, Regional Board staff stated that dilution "granted" in some permits may be less than what exists in the receiving water, but also, "I'm absolutely not saying that there aren't permits that are not right around 20:1." (Hearing Transcript, pp. 432:25-433:1.)

[87] The revised November Tentative Permit, released after receipt of the District's October 2010 Comments and Evidence Letter, states that Regional Board staff sought a DPH recommendation "rather than" rely upon the 20:1 policy. (See November Redline Tentative Permit, p. F-78; Permit, p. F-75.) The District would characterize the request as more akin to an adjunct to the 20:1 policy that ultimately served to confirm the lack of need for filtration. (See also Letter dated June 9, 2009, to Ken Landau, RWQCB, from Robert Seyfried, SRCSD, re: Comments on Letter to Carl Lischeske (May 11, 2009) Requesting a Health Risk Assessment for Sacramento Regional Water Treatment Plant Discharge to the Sacramento River.) The Permit also states that Regional Board staff "requested guidance" from DPH related to certain research by Dr. Robert Emerick. (Permit, p. F-75.) DPH provided no such guidance. However, in comments on the September Tentative Permit relating to this issue, the District explained:

> The reference within the Tentative Permit on pages F-73 and F-74 [of the September Tentative Permit] to Dr. Robert Emerick's study on UV disinfection of wastewater particles is not relevant to the discussion of relative risks to contact recreation due to protozoan pathogens. The Tentative

Cryptosporidium and *Giardia* are less susceptible to inactivation by chlorine than coliform, subsequent inquiry focused on the risk of illness from these organisms based on ingestion of river water. DPH staff initiated a preliminary evaluation, but it was agreed that there were significant problems and uncertainties with that work.[88] DPH and Regional Board staff then endorsed the recommendation that an expert risk evaluation be conducted by Dr. Charles Gerba. Dr. Gerba is a Professor of Environmental Microbiology at the University of Arizona, and a renowned expert on microbial risk assessment. Among other things, he has produced over 500 articles, including textbooks, in environmental science and risk assessment. He has served as an advisor to multiple federal and state agencies, and conducts research on microbial fate and transport in the environment and wastewater treatment.[89] With interaction and input by Regional Board staff and DPH, Dr. Gerba prepared a draft report and then a report dated February 23, 2010.[90] Dr. Gerba also subsequently submitted written testimony in October of 2010, and testified and presented evidence at the Regional Board hearing.[91] None of Dr. Gerba's work or testimony has been disputed.

Dr. Gerba performed a quantitative microbial risk assessment to determine the risk of acquiring gastrointestinal illness from *Giardia* and *Cryptosporidium* via ingestion of river water.

> Permit states that, '[C]entral Valley Water Board staff requested guidance on whether Dr. Emerick's research that the Discharger's effluent had high (20) percent of coliform associated particles could be underestimating the pathogenic risk of the discharge.' The focus of the study was on UV disinfection of particle-associated coliform bacteria. The researchers collected effluent samples prior to disinfection from several locations in California, including SRWTP. One component of the study was to analyze the fraction of wastewater particles that harbored coliform bacteria—the result to which the Tentative Permit refers. The study included no speculation of the pathogenic risk associated with any treatment plant, let alone one using chlorine disinfection, based on the particle-association results. (District's October 2010 Comments and Evidence Letter, p. 9.)

Staff Response to Comments provides no response to the District's accurate comment on this point.

[88] See, e.g., Letter dated August 23, 2010, to Ken Landau, RWQCB, from Stan Dean, SRCSD, re: Review of Department of Public Health Records Pertaining to SRCSD NPDES Permit Renewal Recommendation, p. 1.

[89] See [Written] Testimony/Comments of Charles P. Gerba, Ph.D., Related to Draft NPDES Permit for the Sacramento Regional Wastewater Treatment Plant, submitted on October 11, 2010 (Gerba Written Testimony), p. 1 and Attachments to Gerba Written Testimony; SRCSD Hearing Exhibits, PowerPoint slide 30.

[90] *Estimated Risk of Illness from Swimming in the Sacramento River*, Report for Sacramento Regional County Sanitation District (SRCSD), Charles P. Gerba, Ph.D. (Feb. 23, 2010) (February 2010 Risk Assessment Report).

[91] Gerba Written Testimony, pp. 1-5; Hearing Transcript, pp. 208:14-221:20; SRCSD Hearing Exhibits, PowerPoint slides 31-40.

The analysis relied upon standard microbial risk assessment methods.[92] The analysis calculated risks of illness based on compiled ambient water quality data from four locations: Veteran's Bridge, which is 8 miles upstream of the SRWTP discharge; Freeport (sometimes referred to as "Freeport Marina"), which is immediately upstream of the discharge; Cliff's Marina, which is approximately 0.5 miles downstream of the discharge; and River Mile 44, which is approximately 1.5 miles downstream of the discharge. It also calculated risk of a 20:1 blend of upstream river water and effluent, a condition hypothetically assumed to exist at all times in the assessment.[93]

The report compared these risks to acceptable risk levels identified by U.S. EPA in U.S. EPA's "Ambient Water Quality Criteria."[94] This U.S. EPA acceptable risk level is 8 illnesses per 1000 bathers/swimmers.[95] The report also notes that in the case of recreational waters, risk of illness is used rather than risk of infection. Forty to fifty percent of persons infected actually experience gastrointestinal illness.[96]

For purposes of the February 2010 Risk Assessment Report, very conservative, and conservatively compounding, assumptions were employed. For example, the February 2010 Risk Assessment Report used a conservative assumption with respect to the viability of *Giardia* cysts in SRWTP effluent. Not all the cysts or oocysts in measured water are viable (capable of causing an infection).[97] While no data exist on the percentage of *Giardia* cysts in secondary-treated wastewater that are viable, such data do exist for *Cryptosporidium* oocysts. This percentage

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[92] Gerba Written Testimony, p. 1.

[93] February 2010 Risk Assessment Report, pp. 3-5; Hearing Transcript, pp. 211:12-18, 213:21-214:1; SRCSD Hearing Exhibits, PowerPoint slides 37-39. As water moves further downstream, potential impacts attributable to the SRWTP discharge diminish. (See, e.g., Gerba Written Testimony, p. 3.) The February 2010 Risk Assessment Report, on page 5, relates certain data on the frequency of occurrence of dilution of 20:1. These frequencies are based on an assumed permitted 218 mgd ADWF rather than 181 mgd. The report was prepared before the District decided to withdraw its request for an increase to 218 mgd as permitted flow.

[94] *Ambient Water Quality Criteria for Bacteria – 1986* (U.S. EPA, Jan. 1986, EPA440/5-84-002) (U.S. EPA Recreation Criteria Document).

[95] U.S. EPA Recreation Criteria Document, p. 9; Hearing Transcript, p. 210:21-25. As was pointed out by DPH, the February 2010 Risk Assessment Report inadvertently cited a 19 per 1000 swimmers threshold that applies to salt water rather than the 8 per 1000 acceptable risk that is applicable to freshwater recreation. The oversight is not material.

[96] February 2010 Risk Assessment Report, p. 9; Hearing Transcript, p. 209:5-7.

[97] February 2010 Risk Assessment Report, p. 7; Hearing Transcript, p. 212:6-12.

value was used for *Cryptosporidium*, but it was also simply, and very conservatively, assumed in the February Report that an equal percentage of *Giardia* cysts from the SRWTP were viable.[98]

In addition, although the U.S. EPA acceptable or recommended risk levels are based on one swimming or bathing exposure (also referred to as swimming activity day), the February 2010 Risk Assessment Report calculates risk from both one day of swimming activity and ten days of swimming activity.[99]

Also, the February 2010 Risk Assessment Report assumed that each individual swallows 100 mL of water during a day of swimming activity. This is *two to sixteen times greater* than amounts typically used in such risk assessments. U.S. EPA studies indicate that *37 mL* is a more appropriate value for a day of swimming. Nonetheless, the 100 mL assumption was applied throughout, unquestionably representing another very conservative assumption.[100]

The resultant risk calculations are generally reflected in Tables 3-5 of the February 2010 Risk Assessment Report. Thus, for example, referencing Table 4 and using the applicable conservative assumptions, the calculated average risk of illness from ingesting *Cryptosporidium* for a swimmer at Veteran's Bridge is 1.20×10^{-5} (or, 1.2 in 100,000), and at River Mile 44 it is 1.27×10^{-5} (or, 1.27 in 100,000).

The February 2010 Risk Assessment Report found that for all scenarios evaluated, even combining risks from the two protozoa under the suite of conservative assumptions, the risk was below the U.S. EPA recreational criteria accepted risk value by two to three orders of magnitude.[101]

[98] February 2010 Risk Assessment Report, p. 7; Gerba Written Testimony, p. 3; Hearing Transcript, p. 212:15-18.

[99] Gerba Written Testimony, p. 2; Hearing Transcript, p. 212:18-19; SRCSD Hearing Exhibits, PowerPoint slide 34.

[100] February 2010 Risk Assessment Report, p. 8; Gerba Written Testimony, p. 2; Hearing Transcript, pp. 212:20-213:2.

[101] February 2010 Risk Assessment Report, p. 10; Hearing Transcript, p. 211:18-20; SRCSD Hearing Exhibits, PowerPoint slide 33.

2. Letter From DPH and Response

DPH wrote to Regional Board staff on June 15, 2010, after review of the February 2010 Risk Assessment Report.[102] DPH pointed out (not specifically referencing, but presumably using, Table 5 on p. 16 of the February 2010 Risk Assessment Report) that the calculated risk of illness reflected for swimmers was on average 1.3 per 10,000 at Veteran's Bridge (upstream), 1.2 per 10,000 at Freeport (upstream), 1.8 per 10,000 at Cliff's Marina (.5 mile downstream), and 3.4 per 10,000 at River Mile 44 (1.5 miles downstream).[103] The "bottom line" recommendation in the DPH letter was that SRCSD's effluent not cause an additional risk of infection greater than 1 in 10,000.[104]

In a letter of June 30, 2010, the District responded to the DPH letter, noting the extremely conservative nature of the DPH recommendation, the high cost of filtration, and the fact that the February 2010 Risk Assessment Report used extremely conservative assumptions. The District also pointed out that even with all the conservative assumptions, the difference at .5 miles downstream was not statistically significant, and while the difference at 1.5 miles downstream was statistically significant, the value may be influenced by different factors such as the marina or other inflows. In addition, there were certain misstatements in the DPH letter that required clarification or correction. The District also noted that, even though the risk level recommendation proposed by DPH was extremely conservative, the level could be met if just one of the conservative assumptions were more realistic.[105] In written testimony subsequently submitted in October, Dr. Gerba explicitly agreed with the District's communications in this

[102] Letter dated June 15, 2010, to Kenneth D. Landau, RWQCB, from Gary H. Yamamoto, P.E., DPH, re: Request for Health Risk Assessment for Sacramento Regional County Sanitation District (SRCSD) Discharge to Sacramento River, Sacramento County (DPH June 2010 Letter).

[103] DPH June 2010 Letter, p. 2.

[104] DPH June 2010 Letter, p. 3.

[105] See Letter dated June 30, 2010, to Ken Landau, RWQCB, from Stan Dean, SRCSD, Subject: California Department of Public Health letter dated June 15, 2010 (District's June 2010 Letter), pp. 2-4; see also Letter dated August 23, 2010, to Ken Landau, RWQCB, from Stan Dean, SRCSD, Subject: Review of Department of Public Health Records Pertaining to SRCSD NPDES Permit Renewal Recommendation. The District notes that in the cited June 30, 2010, letter (p. 3) there is discussion of the frequency of occurrence of 20:1 dilution, but this is based on assumed permitted flow of 218 mgd rather than 181 mgd.

regard as related to the microbial risk analysis, in addition to addressing additional topics discussed below.[106]

3. Permit Discussion of February Report

The Permit contains severe mischaracterizations or misunderstandings regarding the February 2010 Risk Assessment Report. Further, the Permit *does not address at all* Dr. Gerba's written testimony or testimony at the hearing. Nor has anyone disputed Dr. Gerba's analysis or testimony, a fact that undercuts much of the discussion in the Permit. The District addresses, immediately below, the Permit findings and related material that pertain only to the February 2010 Risk Assessment Report. Thereafter, in section V.C.4 below, the District discusses Dr. Gerba's subsequent testimony and the Regional Board's failure to consider that evidence at all.

The revised November Tentative Permit and the adopted Permit contain discussion that requires attention related to both the acceptable risk level identified by U.S. EPA (which the Permit refers to as the "Beach Standard") and the February 2010 Risk Assessment Report.[107] With respect to the U.S. EPA risk level, the Permit states that this level is not applicable for discharge of treated sewage or a "policy" of U.S. EPA.[108] The District submits that these statements are incorrect and misleading. In fact, the U.S. EPA acceptable risk level was developed with specific attention to waters affected by wastewater discharge.[109] The U.S. EPA freshwater recreational criteria are values developed to assist states in the development of bathing standards, and the criteria are intended to represent an acceptable rate of illness.[110]

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[106] Gerba Written Testimony, p. 2.

[107] November Redline Tentative Permit, p. F-80; Permit, pp. F-76 to F-77.

[108] November Redline Tentative Permit, p. F-80; Permit, p. F-76.

[109] See Gerba Written Testimony, p. 2 ("The USEPA 1986 standards apply to all surface recreational waters regardless if they are directly influenced by treated wastewater or not."); U.S. EPA Recreation Criteria Document, p. 3 (U.S. EPA criteria based on studies whose goals included "to determine if swimming in sewage-contaminated water carries a health risk for bathers"); U.S. EPA Recreation Criteria Document, p. 5 ("[T]he association of illness in swimmers using bathing water contaminated by treated sewage is an important aspect of the process for developing recreational water quality criteria[.]"). With these considerations, the studies went on to establish a quantitative relationship between gastroenteritis and indicator bacteria concentrations.

[110] The U.S. EPA Recreation Criteria Document (p. 6) contains a section titled "Basis of Criteria for Marine and Fresh Recreational Waters" which defines "recreational water quality criterion" and notes that, from such a definition, "a criterion now can be adopted by a regulatory agency, which establishes upper limits for densities of

The risk levels from the U.S. EPA Recreation Criteria Document have been used in recent U.S. EPA regulations adopting *regulatory* criteria for various states. In 2000, Congress passed the Beaches Environmental Assessment and Coastal Health Act of 2000 (Pub.L. No. 106-284 (Oct. 10, 2000) 114 Stat. 870) (BEACH Act) which required states to adopt either the U.S. EPA 1986 Criteria or criteria "as protective" as the U.S. EPA recommendation. The U.S. EPA's 2004 Water Quality Standards for Coastal and Great Lakes Recreation Waters promulgated water quality criteria for the remaining states that had not yet adopted protective criteria, putting in place regulatory criteria corresponding to an illness rate of 0.8% for swimmers (the U.S. EPA criteria value) in freshwater.[111]

The revised November Tentative Permit and the adopted Permit contain confusing statements or findings related to what would occur "if" a water is at the U.S. EPA acceptable risk level, including a statement that: "If the Beach Standard is applied to the SRCSD discharge, under the most critical river conditions," the discharge would cause nearly 1 in 100 recreaters to become ill.[112] While there is no reference in this passage of the Permit to any data, the statement is at best inaccurate and misleading. First, the statement confuses the risk threshold with the conditions that actually exist in the Sacramento River. Including any effect of the SRWTP with current disinfection levels, the risk levels are orders of magnitude less than the U.S. EPA acceptable risk level. The District has *not* contended that the U.S. EPA recommended risk level should be the water quality objective or that the SRWTP disinfection requirements should be changed to allow discharge that would precisely result in this risk level in the Sacramento River; the District has consistently pointed out that under all conditions, the actual risks in the river are dramatically

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indicator bacteria in waters that are associated with acceptable health risks for swimmers." Further on in the document, it is stated that U.S. EPA's evaluation of bacteriological data indicated that using their recommended indicator levels would cause an estimated 8 illnesses per 1000 swimmers at freshwater beaches. (U.S. EPA Recreation Criteria Document, p. 9.) The document notes that those relationships are approximate, but states: "However, these are EPA's best estimates of the accepted illness rates for areas which apply to EPA fecal coliform criterion." (U.S. EPA Recreation Criteria Document, p. 9.)

[111] 69 Fed. Reg. 67218-67243, 67232 (Nov. 16, 2004) (codified at 40 C.F.R. § 131.41) ("EPA is promulgating water quality criteria that correspond to an illness rate of 0.8% for swimmers in freshwater[.]").

[112] November Redline Tentative Permit, p. F-80; Permit, p. F-77.

lower than the acceptable risk level used by U.S. EPA and many states.[113] The risk associated with the SRCSD discharge is simply not what is suggested by the finding.[114]

The Permit contains essentially no discussion of any actual risk associated with the discharge other than a statement, unsupported by any data, that "at times" the risk "nearly quadruples" downstream of the discharge as compared to upstream.[115] Materials external to the Permit, including the Staff Report, include a statement that the February 2010 Risk Assessment Report "concluded" that, with conservative assumptions, there is an increased risk of illness of downstream water recreationists from *Giardia* and *Cryptosporidium* of 1.6 to 3.7 times.[116] Such statements or findings are not conclusions of the February 2010 Risk Assessment Report. They may have been derived from tables in the report, although it is not clear who calculated the figures or how. Beyond that, at minimum, they do not appear to account for the inherent variability in pathogen data and associated risk calculations, and there is no recognition of the small absolute risk calculated for any scenario (e.g., a theoretical doubling or quadrupling of a near-zero risk still results in a near-zero risk). Nor do the findings take into consideration other evidence or points discussed herein.

Regional Board staff presentation at the hearing cited a "1.5 to 3.7" increase in risk and referred to a "doubling" of risk, from one unidentified value to another unidentified value.[117] Staff also referred to extreme and non-representative conditions not even analyzed in the February 2010 Risk Assessment Report and for which there is thus no technical analysis. These characterizations suffer from the same deficiencies noted above, including the failure to consider

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[113] The referenced statement in the Permit is confusing, given that the U.S. EPA recreation criteria are based on a linkage of gastroenteritis and swimming in wastewater-influenced waters, and subsequent determination of an indicator bacteria concentration which will be protective of human health. The criteria are based on a risk of illness which combines wastewater influence with natural bacteria sources. There is no support in the U.S. EPA Recreation Criteria Document for the claim that treated effluent would raise the risk of receiving water which meets the U.S. EPA criteria – the acceptable risk level already accounts for all pathogen sources contributing to risk in the water. (U.S. EPA Recreation Criteria Document, p. 9.)

[114] See also discussion in section V.C.4.

[115] Permit, p. F-95.

[116] See Staff Report, pp. 24-25.

[117] Hearing Transcript, p. 94:3-20.

overall risk and the low absolute values under any scenario. In addition, however, it was later disclosed that the Regional Board staff hearing testimony was based on the *wrong data*.[118] Thus, the testimony does not have utility. (The District is uncertain whether the Permit findings or Permit-related documents referenced above may also have been based on the wrong data.)

The Permit does not meaningfully consider the exceptionally small risks, or that they were the product of very conservative assumptions.[119] Moreover, as discussed below, the Permit does not consider in any way Dr. Gerba's uncontroverted testimony and analysis concerning inactivation of *Giardia* through the SRWTP treatment processes.[120]

4. Additional Evidence Entirely Ignored in the Permit

In addition to other comments and evidence submitted concerning the September Tentative Permit, in October, the District transmitted written testimony of Dr. Gerba.[121] In his written testimony and testimony at the Regional Board hearing, Dr. Gerba described the preparation and outcomes of the February 2010 Risk Assessment Report. He expressed his

[118] Mr. Landau, Regional Board Assistant Executive Officer: "In closing, filtration. First, there was a discrepancy in the data I was putting on Power Point slides versus the districts. That was my mistake. I had actually grabbed an earlier version of the report. The parasite data is the same, but the health risks numbers were somewhat different." (Hearing Transcript, pp. 431:21-432:1.) The discrepancy in data referred to by Mr. Landau was the subject of a brief interruption of Dr. Gerba's hearing testimony that was ultimately resolved by confirmation that the data Dr. Gerba was describing were in fact in the record. (Hearing Transcript, pp. 218:3-219:8.)

[119] For example, the District's June 2010 Letter (p. 4) included the observations that reasonable assumptions "would result in a projected risk of infection of less than 1 in 10,000 in the Sacramento River downstream from the SRWTP discharge." The District strongly takes issue with the Staff Report's discussion of this reality. Specifically, the Staff Report appears to insist that all assumptions be treated as District-created true facts, and that the District should not treat the February 2010 Risk Assessment Report as "wrong." (Staff Report, pp. 28-29.) The District does not assert that the assessment was wrong. Rather, the District asserts that the February 2010 Risk Assessment Report supports that, even with the most conservative assumptions, there is no meaningful change in risk associated with the SRWTP discharge, and that no further analysis should have been needed. However, it is hardly wrong to examine the reasonableness of assumptions if the consequences of failing to do so are extreme.

In this regard, the September Tentative Permit (p. F-75) recognized realities and included a statement that "it is possible that further refinement of the Discharger's health risk assessment would demonstrate that the Discharger already achieves the health risk recommended by DPH." It is extremely troubling that this passage was *deleted* after receipt of all the District's materials submitted in October, rather than evidence being *considered*. (See November Redline Tentative Permit, p. F-80.)

[120] Section V.C.4, *infra*.

[121] Gerba Written Testimony; Hearing Transcript, p. 208:14-18.

conclusion that the "SRWTP discharge does not result in a meaningful increase in risk to recreationists of waterborne disease."[122]

In addition, Dr. Gerba explained that, since completion of the February 2010 Risk Assessment Report, he had also considered the effect of current SRWTP disinfection practices on the viability of *Giardia* cysts: "The impact of chlorination on the discharge from the [SRWTP] was not considered in the [February 2010 Risk Assessment Report's] assessment of *Giardia* viability. *Giardia is much more susceptible to inactivation by free chlorine and chloramines than Cryptosporidium*[.]"[123]

As described below, Dr. Gerba went on, in his October written testimony, to discuss *Giardia* inactivation by the chloramines that are formed in the disinfection process.[124] Preliminarily, however, it requires emphasis that this information is uncontroverted in the record, and the Regional Board ignored it entirely. In this regard, the District's comment letter submitted in October simultaneously with Dr. Gerba's Written Testimony stated:

> However, *Giardia* is much more susceptible to inactivation by free chlorine and chloramines than *Cryptosporidium* and therefore would experience greater inactivation by chloramines in the SRWTP effluent before discharge . . . . Dr. Gerba provides further analysis and conclusions in accompanying material [i.e., the written testimony], which constitutes additional comment and evidence.[125]

The Staff Response to Comments *does not respond* to this comment at all. This is significant because, alone, consideration of inactivation of *Giardia* result in risk values associated with the SRWTP being lower still than under the assumptions of the February 2010 Risk Assessment Report.

Dr. Gerba's analysis, as described in his testimony, leads to the conclusion that in assessing in-river risks, the risk of illness from *Giardia* associated with the discharge is essentially eliminated, and the proper focus in assessing discharge-related risk is thus

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[122] Gerba Written Testimony, p. 5; see Hearing Transcript, p. 215:14-19.

[123] Gerba Written Testimony, p. 3, emphasis added; see also Hearing Transcript, p. 215:14-19; SRCSD Hearing Exhibits, PowerPoint slide 40.

[124] Gerba Written Testimony, pp. 3-5.

[125] District's October 2010 Comments and Evidence Letter, p. 11, citation omitted.

Cryptosporidium.[126] Dr. Gerba explained that chloramines are formed as a result of chlorine use in the disinfection process. He analyzed *Giardia* inactivation from chlorine/chloramines based on U.S. EPA guidance as a function of contact time and temperature of the SRWTP effluent. He confirmed that there are no in-river risks from *Giardia* attributable to the effluent. Accordingly, *Cryptosporidium*, not *Giardia*, is the appropriate microbe to consider in evaluating SRWTP's risks to recreaters from ingestion of river water.[127]

The data related to in-river risk from *Cryptosporidium* are in Table 4 of the February 2010 Risk Assessment Report, and are depicted on PowerPoint slides 38 and 39 of SRCSD's Hearing Exhibits. The calculated risks for a swimming day are:

Veteran's Bridge:	1.2:100,000
Freeport:	1.04:100,000
Cliff's Marina:	1.09:100,000
River Mile 44:	1.27:100,000

Even assuming for the sake of argument that the differences are statistically significant, they are trivial, and for each location the risk of illness is approximately *1:100,000*.

5. Summary of Evidence

The District does not concur that the DPH "recommendation" is an appropriate basis for regulation. First, it advocates extremely costly treatment based on a risk value or change in risk that is unduly low. Indeed, the value is based on drinking water standards, not recreation.[128] Second, the value is not based on consideration of ambient water quality conditions or the relative significance or insignificance of any change in water quality that may be caused by the SRWTP. In other words, it is disconnected from development of WQBELs related to ambient WQOs. Third, DPH does not consider the factors provided in Water Code sections 13263(a) and 13241, which the Regional Board must do.[129]

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[126] Hearing Transcript, pp. 213:16-19, 215:14-16, 221:8-20.

[127] Hearing Transcript, pp. 213:16-19, 215:14-16, 221:8-20; SRCSD Hearing Exhibits, PowerPoint slide 35 ("*Cryptosporidium* represents the only microbial risk from SRWTP discharge.").

[128] See also Gerba Written Testimony, p. 2 ("In my experience spanning 33 years, I have not encountered a regulatory agency using a 1:10,000 risk threshold for contact recreation in surface waters.").

[129] See section V.D, *infra*.

With that said, however, the uncontroverted evidence in the record is that the DPH recommendation *is met* with *current* treatment. In particular, the uncontroverted evidence is:

The SRWTP does not increase risk of illness from *Giardia* in the river, due to inactivation of *Giardia* in the specific disinfection circumstances of the SRWTP.

and

Increased risk of illness from *Cryptosporidium* contributed by the SRWTP is much less than 1 in 100,000.[130]

The Regional Board did not consider this evidence at all. Again, the District reiterates that the DPH position is inappropriate. However, that position was that the SRWTP not increase the risk of infection by more than *1* in *10,000*. There is uncontroverted evidence in the record that the SRWTP does not cause an increase of this magnitude.

D. The Regional Board Did Not Comply With Water Code Sections 13263(a) and 13241 and the Findings Are Unsupported and Improper

The September Tentative Permit proposed filtration requirements.[131] Such requirements are, obviously, more stringent than necessary to implement any adopted WQO.

Water Code section 13241 provides:

> Each regional board shall establish such water quality objectives in water quality control plans as in its judgment will ensure the reasonable protection of beneficial uses and the prevention of nuisance; however, it is recognized that it may be possible for the quality of water to be changed to some degree without unreasonably affecting beneficial uses. Factors to be considered by a regional board in establishing water quality objectives shall include, but not necessarily be limited to, all of the following:
>
> (a) Past, present, and probable future beneficial uses of water.
>
> (b) Environmental characteristics of the hydrographic unit under consideration, including the quality of water available thereto.
>
> (c) Water quality conditions that could reasonably be achieved through the coordinated control of all factors which affect water quality in the area.
>
> (d) Economic considerations.
>
> (e) The need for developing housing within the region.
>
> (f) The need to develop and use recycled water.

[130] Translated to risk of infection, this would mean much less than 2 in 100,000. All the values discussed above ignore potential contribution of other sources between the point of discharge and River Mile 44.

[131] September Tentative Permit, p. 33.

The Chief Counsel of the State Board, in a memorandum interpreting this provision, has explained the Regional Board's affirmative duty to develop and consider information on the section 13241 factors and engage in a "balancing" of factors to develop objectives consistent with the statute.[132]

Water Code section 13263(a) requires that, in the adoption of waste discharge requirements, the Regional Board consider, among other things, the WQOs reasonably required to protect beneficial uses and the provisions of Water Code section 13241. The State Board has recognized that a complete analysis of the Water Code section 13241 provisions is essential when, as here, the Regional Board proposes to adopt effluent limitations more stringent than those required by existing WQOs. If a Regional Board takes this approach, ". . . the rationale for the more stringent limitations must be explained in the permit findings . . . . In addition, the RWQCB must consider the factors specified in Water Code Section 13241[.]"[133] That is, if the Regional Board chooses to implement a more stringent objective on a permit-specific basis, it "must consider the factors specified in Water Code Section 13241."[134]

A conclusory assertion that the Regional Board has considered the Water Code section 13241 requirements is insufficient. The State Board has explained that, "when a Regional Board includes permit limits more stringent than limits based on an applicable numeric objective in the relevant basin plan, the Regional Board must address the section 13241 factors in the permit findings. These factors include, among others, economic considerations, environmental characteristics of the hydrographic unit under consideration, and the need for recycled water."[135] As such, the Regional Board must make findings related to each of the provisions of Water Code

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[132] Memorandum dated January 4, 1994, to Regional Water Board Executive Officers, from William R. Attwater, Chief Counsel of the State Board, re: Guidance on Consideration of Economics in the Adoption of Water Quality Objectives (Attwater Memorandum).

[133] *In the Matter of the Petition of City and County of San Francisco, et al.*, State Board Order No. WQ 95-4 (Sept. 21, 1995), p. 13; see also *In the Matter of the Petitions of Napa Sanitation District, et al.*, State Board Order No. WQ 2001-16 (Dec. 5, 2001), p. 24.

[134] *In the Matter of the Petition of the Cities of Palo Alto, Sunnyvale and San Jose*, State Board Order No. WQ 94-8 (Sept. 22, 1994), p. 11.

[135] *In the Matter of the Review on Own Motion of Waste Discharge Requirements Order No. 5-01-044 for Vacaville's Easterly Wastewater Treatment Plant*, State Board Order WQO 2002-0015 (Oct. 3, 2002), p. 35, footnote omitted.

section 13241.[136] Prior to the September Tentative Permit, the Regional Board routinely acknowledged such an obligation. The Regional Board would expressly state in permits that it was making specific findings "[i]n accordance with CWC Section 13241," including individual consideration of past, present, and future probable beneficial uses of the water, environmental characteristics of the hydrographic unit, water quality conditions that could be reasonably achieved, economics, the need for housing in the region, and the need to develop and use recycled water.[137]

The September Tentative Permit, however, made no reference at all to the Regional Board's obligations under Water Code sections 13263(a) and 13241 with respect to the proposed filtration requirements. In its comments on the September Tentative Permit, the District pointed out this glaring deficiency.[138]

The revised, November Tentative Permit included an entirely new discussion and findings regarding Water Code section 13241 factors.[139] The Regional Board afforded no opportunity for written comment on this substantial revision. In any event, the findings are superficial, incorrect, unsupported by evidence, and not consistent with the requirements of the Water Code.

As a preliminary matter, however, the District observes that the Permit suggests that *any* increase in risk from the SRWTP discharge, however small, would not be allowed.[140] Such a position is inconsistent with the Water Code[141] and, for that matter, with any recommendation or accepted risk level in the record.

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[136] See, e.g., State Board Order WQO 2002-0015, *supra*, p. 35 (issue remanded and Regional Board directed to revise its findings to expressly address Wat. Code, § 13241 factors which had not been addressed); see also State Board Order No. WQ 95-4, *supra*, pp. 13-14 (permit remanded to Regional Board for failure to consider the factors specified in Wat. Code, § 13241).

[137] See, e.g., Order No. R5-2007-0031-01 (City of Angels Wastewater Treatment Plant) pp. F-26 to F-28; Order No. R5-2007-0036, *supra*, pp. F-40 to F-41; Order No. R5-2007-0039 (Mountain House Community Services District), pp. F-43 to F-44.

[138] District's October 2010 Comments and Evidence Letter, pp. 6-7.

[139] See November Redline Tentative Permit, pp. F-77 to F-78; Permit, pp. F-79 to F-80. The Staff Response to Comments suggests that the Permit "merely implements existing water quality objectives" from the Basin Plan and that compliance with the Water Code is discretionary in this circumstance. (Staff Response to Comments, p. 6.)

[140] Permit, p. F-77.

[141] See, e.g., Wat. Code, §§ 13000, 13001, 13241, 13263(a).

1. Water Code Section 13263(a)

Under Water Code section 13263(a), the Regional Board must take into consideration, among other things, "the water quality objectives reasonably required" to protect beneficial uses. Nowhere does the Permit, or do findings in the Permit related to the filtration requirements, identify such WQOs or address this issue in any way. Neither of these suggestions is accurate.

2. Water Code Section 13241

In its hurriedly-crafted and superficial Water Code section 13241 "findings," the Regional Board did no more than advocate advanced treatment. Each of the Water Code section 13241 factors, and the deficiencies of Regional Board's findings, is addressed below.

Water Code section 13241(a) requires the Regional Board to consider the "[p]ast, present, and probable future beneficial uses of water." Here, the findings accurately list the beneficial uses of the Sacramento River and Delta. However, certain other discussion of beneficial uses merits attention. With respect to irrigation[142], during the course of Permit development, Regional Board staff requested that the District provide information on irrigation use of the Sacramento River. The District did so early in the renewal process. In 2004, the District provided evidence from a knowledgeable engineer who works with 25 Reclamation Districts in the Delta.[143] There are three types of pump designs used for withdrawing water from the Sacramento River: a vertical pump, a slant pump, and a siphon pump. Vertical pumps are set on a platform with a pipe going down vertically into the water. Slant pumps have a pipe running along the face of the levee. Siphon pumps are not used in the area near the District's outfall. Use of siphon pumps starts further south on the Sacramento River near Rio Vista. Neither slant nor vertical pumps go much below the surface with a typical depth between 5 feet and 10 feet below mean sea level. In fact, they are shallow enough that they run the risk of the pump cavitating at low tide. In addition, the pipes from these pumps do not stick out horizontally into the water. Therefore, they would draw water near the riverbank and, in general, outside the direct influence

[142] See Permit, pp. F-74 to F-75.

[143] See Letter dated December 15, 2004, to K. Landau, RWQCB, from R. Seyfried, SRCSD, re: NPDES Permit Responses to Comments Raised at Meeting of November 19, 2004.

of the SRWTP effluent plume, which emanates from a diffuser located on the river bottom in the middle of the river.

Modeling (calibrated and validated with multiple dye studies) has shown that up to 700 feet downstream of the discharge, no effluent (diluted or undiluted) is present in the river within approximately 100 feet of either riverbank. Typically, dilution is far greater than 20:1. At Harmonic Mean Flows, the river:effluent flow ratio is 56:1 for 181 mgd of effluent flow. At critical low river flows as represented by the lowest 7-day average flow expected to occur once in ten-years (7Q10) (i.e., 5820 cfs), dilution is 21:1 at a discharge rate of 181 mgd. River flows as low as the 7Q10 occur infrequently. Between 1970 and 2009, river flow was at or below 5820 cfs approximately 0.58 percent of the time.[144] In short, there is no evidence of any appreciable risk related to irrigation of food (or other crops) that would necessitate filtration.

Regional Board staff also requested that the District conduct the recreational user risk assessment described previously. As the Permit recites, contact recreation is considered the most sensitive use, such that, if it is protected, other beneficial uses will be protected.[145] However, the revised November Tentative Permit and Permit as adopted[146] also include generalized reference to Municipal (MUN) use. There is no evidence of any risk or any meaningful effect on risk to consumers of water of any kind; nor did DPH itself or anyone else identify any such risk as a concern. The nearest drinking water intake is the Barker Slough Pumping Plant, which is approximately 40 miles downstream of the discharge.[147] The California Urban Water Agencies (CUWA) stated that pathogens from the SRWTP "are not currently impacting drinking water

[144] District's October 2010 Comments and Evidence Letter, p. 8.

[145] See, e.g., Permit, p. F-75 ("DPH determined that if contact recreation is protected then agricultural irrigation and other Delta beneficial [sic] uses that could be impacted by pathogens would also be protected.").

[146] November Redline Tentative Permit, p. F-77; Permit, p. F-78.

[147] Permit, p. F-36. As stated in the District's October 2010 Comments and Evidence Letter and reflected in the record: *Giardia* and *Cryptosporidium* are not detected frequently in State Water Project waters according to the 2006 State Water Project Sanitary Survey. The source of waters for all of the drinking water treatment plants analyzed was classified as Bin 1 (no additional treatment required under Long Term 2 Enhanced Surface Water Treatment Rule (LT2ESWTR)). (District's October 2010 Comments and Evidence Letter, p. 11 [referencing California State Water Project Watershed Sanitary Survey, 2006 Update, prepared for the Sate Water Project Contractors Authority by Archibald Consulting, Richard Woodward Water Quality Consultants, Palencia Consulting Engineers (June 2007)].)

quality/treatment[.]"[148] Similarly, a group of Delta export contractors recommended that disinfection requirements remain the same for existing flows.[149] The Permit refers to unspecified "small drinking water systems throughout the Delta" and suggests such systems "may" divert surface water with no treatment at all.[150] Again, there is no evidence of such use or where it supposedly occurs, let alone any evidence of a risk of any kind, let alone any significant risk, caused by the SRWTP to any consumers of water. In short, the Permit suggestions regarding MUN use are a red herring. As *DPH* identified, contact recreation is the appropriate focus.

In this regard, the District certainly concurs that the Regional Board should regulate for the reasonable protection of the REC-1 use. However, it is of little relevance to say that the Sacramento River and Sacramento-San Joaquin Delta supports 12 million recreational user days per year.[151] This number greatly overstates the use of the lower Sacramento River below the SRWTP discharge. In addition, non-contact recreational use such as hiking, sightseeing, birdwatching, and any other recreational activities distant from the immediate receiving water are not pertinent to the issue of impacts associated with the SRWTP discharge. Risk calculations referred to in the February 2010 Risk Assessment Report and Permit are based on a day of swimming. Risks associated with fishing and boating are much lower.[152] And, any effect on risk that could be attributable to the SRWTP diminishes as water moves downstream due to fate and transport processes and any additions of flow from other sources.[153] Again, the District does not dispute that downstream waters should have protection of REC-1 beneficial use consistent with

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[148] California Urban Water Agencies' February 1, 2010, Letter to K. Harder, *Comments on Issue Paper on NPDES Permitting Renewal Issues Drinking Water Supply and Public Health for the Sacramento Regional Wastewater Treatment Plant*, p. 2.

[149] Letter dated February 1, 2010, to Kathy Harder, RWQCB, from Walter Wadlow, Alameda County Water District, et al., re: Comments on Drinking Water Supply and Public Health Issues Concerning the Sacramento Regional Wastewater Treatment Plant NPDES Permit Renewal (Wadlow Letter), p. 15. Both CUWA as cited in the preceding footnote and the individual contractors in the Wadlow Letter advocated filtration for increases in discharge above current actual flow levels up to the 218 mgd that was contemplated as of the time the letters were sent, but there was no technical justification offered for this position.

[150] November Redline Tentative Permit, p. F-77; Permit, p. F-78.

[151] Permit, p. F-95.

[152] Gerba Written Testimony, pp. 2-3.

[153] Gerba Written Testimony, p. 3.

the Water Code, but the Permit is not forthright in regard to the nature and extent of the affected recreational beneficial use. Discussion beyond saying REC-1 is a beneficial use must be objective.[154]

Water Code section 13241(b) requires the Regional Board to consider the "[e]nvironmental characteristics of the hydrographic unit under consideration, including the quality of water available thereto." The Regional Board failed to consider, or make findings on, this factor. The new "findings" for section 13241(b) state that, "the environmental characteristics of the hydrographic unit, including the quality of available water, will be improved by the requirement to provide tertiary treatment for this wastewater discharge."[155] This finding is meaningless. The hydrographic unit under consideration is, presumably, the lower Sacramento River. The quality of water available thereto would include background or upstream Sacramento River water quality. The Regional Board should have addressed levels of coliform or protozoa that exist in the absence of any discharge.

The Permit findings under section 13241(b) also state that tertiary treatment "will allow for the reuse of the diluted wastewater for food crop irrigation and contact recreation activities that would otherwise be unsafe according to recommendations from DPH."[156] The lower Sacramento River is not "unsafe," nor is there evidence that it is unsafe or has been pronounced unsafe by DPH or other health agencies. Again, the findings do not address at all the existence of risks that exist without any discharge. The Regional Board's purported "finding" is merely another argument for advanced treatment, and is not in any way responsive to the Water Code.

Water Code section 13241(c) requires the Regional Board to consider the "[w]ater quality conditions that could reasonably be achieved through the coordinated control of all factors which affect water quality in the area." The new finding in the Permit on this issue is merely a statement that "[f]ishable and swimmable water quality conditions can be reasonably achieved

[154] In addition, email correspondence from Mr. Lischeske of DPH dated July 27, 2009, states: "Since a relatively small number of people actually get in the Sacramento River below the SRCSD outfall, we don't have a large population to protect from exposure to the effluent."

[155] Permit, p. F-79.

[156] Permit, p. F-79.

through the coordinated control of all factors that affect [sic] water quality in the area," with a description of categories of discharges.[157] The general recitation of the goals of the Clean Water Act, unaccompanied by any analysis, is insufficient. The Regional Board must address the quality of water that can be achieved in the lower Sacramento River. Further, there is simply no evidence that the Sacramento River and Delta are not "swimmable" today, or that the very minor effect on water quality from requiring filtration for the SRWTP discharge would convert the receiving water from "non-swimmable" to "swimmable."

Water Code section 13241(d) requires of the Regional Board to account for economic considerations. With regard to economics, the Permit "findings" include the following:

> The loss of beneficial uses within downstream waters, without the tertiary treatment requirement, which includes prohibiting the irrigation of food crops and prohibiting public access for contact recreational purposes, would have a detrimental economic impact.[158]

This finding borders on the absurd. There is no evidence whatsoever that any such prohibitions—which have never occurred—will occur, let alone any evidence of economic impacts. The "finding" regarding section 13241(d) also merely recites a range of estimates of capital costs to SRCSD and its ratepayers of filtration, without any specific finding or consideration of consequences, reinforcing that the consideration of costs is perfunctory.[159] This finding and another Permit finding also state that tertiary filtration for pathogens may also reduce concentrations of other pollutants.[160] There is no finding of any meaningful change in water quality that results with respect to other pollutants. In fact, the Permit actually ignores evidence that reductions in other pollutants from filtration would result in an immeasurable or *de minimus* change in ambient water quality. For example, the Permit vaguely states that filtration "will" reduce total organic carbon (TOC), without suggesting how much or whether there would be any

[157] Permit, p. F-77.

[158] Permit, pp. F-77 to F-78.

[159] Permit, p. F-79; see also Attwater Memorandum, e.g., p. 3 (the obligation to take into account economic considerations includes "both the cost of providing treatment facilities and the economic value of development").

[160] Permit, pp. F-77, F-79 to F-80.

meaningful benefit. There is uncontroverted evidence in the record that the effects on water quality would be insignificant.[161]

The District stated in comments:

> Page F-75 of the Tentative Permit states that tertiary filtration will or may reduce discharge of other water quality constituents to an unspecified degree. The Regional Board has, of course, authority to require WQBELs where appropriate (and the Tentative Permit proposes WQBELs for some of the described water quality constituents). The Regional Board may not dictate how the District achieves compliance. The general reference to potential effects of filtration does not support the requirement. With respect to BOD and dissolved oxygen specifically, the District has proposed that the SRWTP be regulated to limit discharge of oxygen-demanding substances. The Tentative Permit makes no demonstration that reductions in the listed constituents will provide an important incremental benefit in terms of compliance with objectives or protection of beneficial uses.[162]

Indeed, the Staff Response to Comments acknowledges that the "additional benefits" of filtration identified in the Permit, whatever they may be, are "not reasons for requiring the level of treatment."[163]

Water Code section 13241(e) requires the Regional Board to consider "[t]he need for developing housing within the region." The Permit findings and analysis ignore altogether any comment or evidence in the record of adverse effects on the need for developing housing in the region.[164] Instead, the finding is that the requirement "will not adversely affect the need for

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[161] For example, incremental reduction in TOC concentrations resulting from advanced treatment technologies (including filtration) were specifically evaluated and modeled, and are reflected on pages 4-38 and 4-39 (Figures 4-16 and 4-17) of Technical Memorandum: Analysis of Costs and Benefits of Advanced Treatment Alternatives for the Sacramento Regional Wastewater Treatment Plant (Larry Walker Associates, May 2010). In those figures, Train A and Train C include filtration. Trains D and E include also reverse osmosis to varying degree. (*Id.*, p. III.) The report finds that the very slight changes in receiving water concentrations, even with the reverse osmosis alternatives, would likely not be measurable. (*Id.*, pp. 4-37 to 4-38.) And, there is no basis whatever to suggest that this immeasurable change would have meaning for beneficial uses. Similar analyses were performed for other parameters mentioned in the Permit, with similar conclusions. (See *id.*, pp. 4-13 to 4-15 [copper], 4-40 to 4-41 [mercury].) It should be noted that the "improvement" shown in this report is overstated because there is an assumed discharge and treatment of 218 mgd. Similar to the vague suggestions regarding reduction of other pollutants, qualitative Permit references to "much cleaner" effluents are hallow and merely argumentative. Further, for all discharges, WQBELs should be developed in accordance with applicable law and policy.

[162] District's October 2010 Comments and Evidence Letter, p. 16.

[163] Staff Response to Comments, p. 17. This passage and the Permit on page F-80 include speculation that tertiary treatment might reduce need for advanced treatment for other pollutants. The District is aware of no specific evidence of any such "savings" associated with compliance with other Permit provisions.

[164] See, e.g., Letter dated October 8, 2010, to Kenneth D. Landau, RWQCB, from Dennis M. Rogers, Building Industry Association, re: Comments on the Tentative Waste Discharge Requirements (NPDES Permit

housing in the area any more than for other adjacent communities."[165] While the finding is vague, there is no evidence to support it. Further, the finding does not comply with the statute in any event, as the statute does not invite such comparisons to other communities, vague or otherwise. The finding goes on to say that "[t]he potential for developing housing in the area will be facilitated by improved water quality[.]"[166] Again, there is no evidence in the record that would support that the extremely small change in Sacramento River quality that would result from filtration of the SRWTP discharge will facilitate the potential for housing at some (unspecified) location. The findings under this provision also again state that downstream water would not be "safe" for irrigation or recreation in the absence of filtration; as discussed above, this is unfounded.

Water Code section 13241(f) requires the Regional Board to consider the "need to develop and use recycled water." The Regional Board failed to do so, and its finding is not supported by evidence in the record. The new finding states that "[t]he need to develop and use recycled water is facilitated by providing a tertiary level of wastewater treatment that will allow for a greater variety of uses in accordance with CCR, Title 22."[167] The evidence does not support this finding. The District does not dispute that there is a broader range of potential direct re-use with tertiary effluent than secondary effluent. This does not, however, mean that recycling use (at some undefined location or locations) is promoted by requiring filtration of all flows at SRWTP (including even peak wet weather flows) prior to discharge to the Sacramento River. The Regional Board was informed by the District on this point as follows:

> The Regional Board must also consider the need to develop and use recycled water. (Wat. Code, § 13241(f).) Implementing full Title 22 tertiary treatment at SRWTP would significantly reduce the incentive and ability to recycle water, by diverting potential resources away from recycled water projects to a major

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No. CA0077682) and Time Schedule Order for Sacramento Regional County Sanitation District (SRCSD), Sacramento Regional Wastewater Treatment Plant (SRWTP); see also District's October 2010 Comments and Evidence Letter, p. 15 (filtration requirements "would adversely affect the need to develop housing in the region, by driving up the cost of housing through increased connection fees and users charges which directly affect the cost of living in a house").

[165] Permit, p. F-80.

[166] Permit, p. F-80.

[167] Permit, p. F-80.

> filtration and disinfection treatment project. To the extent recycled water uses require tertiary effluent, the demand can be met by sizing facilities (or, potentially, constructing satellite or scalping facilities) to meet the demand. Demand for recycled water only equates to a fraction of SRWTP flow. Expensive, advanced treatment for the entire flow requires allocation of additional funds that do not serve projected recycled water needs. Thus, requiring full tertiary treatment at SRWTP would act as a substantial economic disincentive to the development and use of recycled water by the District and would hinder rather than facilitate the development of recycled water in the Sacramento region.
>
> Additionally, the District needs to partner with willing water purveyors to implement recycled water projects in their service areas since the District is not a water purveyor. Most of these water purveyors have other water supplies that are more readily available and less expensive compared to the use of recycled water at this time. Lack of funding is one of the key elements that affect the implementation of recycled water projects throughout the state and the Sacramento area. Thus, requiring full tertiary treatment at SRWTP will exacerbate this problem.[168]

The findings do not consider these facts, and the Staff Response to Comments document does not even address this comment and information.

The factors to be considered under Water Code section 13241 are not limited to those specifically enumerated in subdivisions (a)-(f).[169] In this instance, one other consideration is energy demand, which would include effects on greenhouse gas emissions. Uncontroverted evidence at the hearing established that the energy demands (ignoring construction itself) for operation of microfiltration facilities would be equivalent to the demand of 13,000 homes.[170] In its comments on the September Tentative Permit, the District stated, that, "energy demands associated with new treatment processes (and associated greenhouse gas emissions) must be considered to satisfy the Regional Board's obligations under sections 13241 and 13263 of the Water Code."[171]

The Staff Response to Comments does not respond to this comment at all, and the Regional Board ignored the issue.

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[168] District's October 2010 Comments and Evidence Letter, p. 15.

[169] See Wat. Code, §13241 ("Factors to be considered . . . shall include, but not necessarily be limited to, [subdivisions (a)-(f)].").

[170] Hearing Transcript, p. 174:8-10.

[171] District's October 2010 Comments and Evidence Letter, p. 15.

E. Best Practicable Treatment or Control (BPTC)

On page F-97, the Permit includes argument and conclusion that filtration is BPTC. This is incorrect based on the discussion above and section VII below, which addresses the "Satisfaction of Antidegradation Policy" section of the Permit in detail. Page F-77 of the Permit lists other POTWs that implement tertiary treatment and discharge to the Delta. However, those POTWs are not similarly situated to the District. They discharge to EDWs or areas where the Regional Board has found that adequate dilution does not exist, are new discharges, or have themselves proposed tertiary treatment. Entirely missing from the list in the Permit are POTWs that do not implement the tertiary filtration requirements the Permit would require of the District, such as (partial list[172]): Order No. R5-2007-0016 (Sacramento Municipal Utility District); Order No. R5-2007-0032 (City of Biggs); Order No. R5-2007-0041 (City of Red Bluff); Order No. R5-2007-0056 (City of Mt. Shasta); Order No. R5-2007-0058 (City of Redding); Order No. R5-2007-0069 (El Dorado Irrigation District); Order No. R5-2007-0098 (Tehama County Sanitation District No. 1); Order No. R5-2007-0134-01 (City of Yuba City); Order No. R5-2008-0108 (City of Rio Vista); Order No. R5-2008-0162 (Tuolumne Utilities District and Jamestown Sanitary District); Order No. R5-2008-0179 (Town of Discovery Bay CSD); Order No. R5-2009-0007 (San Andreas Sanitary District); Order No. R5-2009-0078 (Chester Public Utility District); Order No. R5-2010-0019 (City Of Chico); Order No. R5-2010-0073 (Sewerage Commission-Oroville); Order No. R5-2010-0080 (City of Corning); Order No. R5-2010-0081 (City of Rio Vista).

If a determination of BPTC is relevant and appropriate in consideration of the dilution provided in the receiving water, *de minimus* nature of risk posed by the current discharge, and costs (economic, environmental, and otherwise) of the Permit filtration requirements, the current level of treatment and disinfection provides BPTC.

[172] The list is a partial list of POTWs who discharge to surface water in the Central Valley region and do *not* have the filtration requirements required of SRWTP in the Permit.

F. Conclusion Regarding Filtration

The Permit analysis resulting in the filtration requirements is not objective, complete, or accurate. There is no meaningful benefit to public health, water quality, or beneficial uses associated with the highly costly filtration requirements, and they are not reasonable by any measure. The State Board should modify the Permit, striking the tertiary filtration requirements and ordering that the total coliform, BOD, and TSS limitations shall, for the life of Order No. R5-2010-0114, be those provided in Regional Board staff "Disinfection Alternative 1," as reflected in paragraph 6.B.ii of the District's Petition.

VI. THE PERMIT IMPROPERLY INCLUDES FINAL EFFLUENT LIMITATIONS AND DENIES MIXING ZONE FOR AMMONIA BASED ON ALLEGED FAR FIELD IMPACTS

The Permit includes effluent limitations for ammonia of 1.8 mg/L as an average monthly effluent limitation (AMEL) and 2.2 mg/L as a daily maximum effluent limitation (MDEL).[173] The limits were calculated based on U.S. EPA's *1999 Aquatic Life Ambient Water Quality Criteria for Ammonia Update* (U.S. EPA ammonia criteria).[174] The limits so-calculated apply end-of-pipe without the consideration of dilution for acute or chronic aquatic life criteria.[175]

The application of end-of-pipe limits and denial of dilution credits in this Permit are in conflict with the Regional Board's normal permitting process and state and federal law. Typically for ammonia, and as the first step here, the Regional Board uses U.S. EPA ammonia criteria to translate the narrative toxicity objective and determine if the discharge has reasonable potential to cause or contribute to a violation of that objective.[176] So too here, the Regional Board effectively treated the U.S. EPA ammonia criteria as the WQO.[177] If the discharge has reasonable potential to exceed the U.S. EPA ammonia criteria, the Regional Board determines if mixing

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[173] Permit, p. 14.

[174] Permit, pp. F-54, F-57.

[175] Permit, pp. F-55 to F-57.

[176] See state's *Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California* (SIP), pp. 5-6; see, e.g., Order No. R5-2007-0036 (City of Tracy), p. F-30; Order No. R5-2007-0113 (City of Lodi), pp. F-22 to F-23; Order No. R5-2010-0092 (Placer County Department of Facility Services), p. F-38; see also Basin Plan, p. IV-17.00; 40 C.F.R. § 122.44(d)(1)(i).

[177] Permit, pp. F-54 to F-55.

zones are proper based on studies and information submitted by the discharger and the availability of assimilative capacity.[178] When it determines that mixing zones are proper, the Regional Board then calculates effluent limitations based on applicable regulations and procedures and with consideration of dilution.[179]

Using this approach, the Regional Board does not dispute that there is sufficient flow and assimilative capacity to allow mixing zones for compliance.[180] However, in this case, the Regional Board abandoned the regulatory process set forth in the SIP and Basin Plan, and employed in other Regional Board permits. Instead, the Regional Board denied the mixing zones based on alleged effects of ammonia "far downstream of the discharge within the Delta[.]"[181] The denial had nothing to do with the effect of the mixing zone itself and discounted that the ammonia concentrations downstream are well below the U.S. EPA ammonia criteria.

The Regional Board's denial of mixing zones is improper on several fronts. First, the determination of negative effects is not supported by proper findings based on evidence in the record. Second, impacts of lower concentrations "far downstream in the Delta" (far field impacts) are unrelated to determinations for acute and chronic aquatic life mixing zones based on the U.S. EPA ammonia criteria. The limits adopted are unrelated to the need for compliance with the U.S. EPA ammonia criteria within or outside a mixing zone, and the Regional Board failed to comply with applicable state and federal regulations for interpreting and applying narrative toxicity objectives to the far field.

Ultimately, the Permit takes a shotgun approach to the denial of mixing zones for ammonia, citing 11 reasons why dilution credits are denied.[182] The reasons are deeply flawed on

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[178] SIP, pp. 15-18; Basin Plan, p. IV-16.00.

[179] SIP, p. 8; see, e.g., Order No. R5-2010-0073 (Sewerage Commission-Oroville Region), p. F-29; Order No. R5-2010-0044 (Shasta County Service Area No. 17), p. F-25.

[180] See, e.g., Staff Report, p. 13 ("If only USEPA's recommended water quality criteria for ammonia are considered, there is sufficient flow and assimilative capacity to allow mixing zones for compliance.").

[181] Permit, pp. F-40 to F-41; Staff Report, p. 7, 16.

[182] Permit, pp. F-56 to F-57. One of the reasons provided, "[a] consensus of scientific experts concluded the SRWTP is a major source of ammonia to the Delta," is a statement of fact unrelated to determinations regarding impacts to aquatic life and the denial of mixing zones. As such, it is an improper finding that should be voided, and there is no need for further discussion below.

a technical level and disastrously flawed as a matter of law and applicable regulatory process. Further, the Regional Board must support its decisions with specific findings based on evidence in the record. In particular, the Regional Board must "set forth findings to bridge the analytic gap between the raw evidence and ultimate decision or order."[183] The findings must also be supported by evidence in the record.[184] The Permit fails this test. The District discusses these matters below, as follows.

First, the District explains why the Regional Board's attempt to rely on SIP criteria for denial of ammonia mixing zones is incorrect.[185] Next, the District discusses alleged effects to aquatic resources including "far downstream in the Delta" and explains why findings that pertain to such effects are erroneous, and why such alleged effects are not properly relied upon—as a legal matter, to deny the mixing zones.[186] Thereafter, the District addresses the impropriety of denying mixing zones for ammonia toxicity on the basis of completely distinct different water quality constituents (dissolved oxygen, nitrosamines), un-adopted water quality criteria, and Best Practicable Treatment or Control (BPTC).[187]

A. Far Field Impacts Are Unrelated to Acute and Chronic Mixing Zone Determinations

As is described below, even if one accepts that there are adverse effects of ammonia for downstream at concentrations below U.S. EPA criteria, the Regional Board has improperly denied mixing zones that are based on compliance with the U.S. EPA criteria outside the mixing zone.

1. Purpose of Mixing Zones

A mixing zone is generally defined as, "[a]n area where an effluent discharge undergoes initial dilution and is extended to cover the secondary mixing in the ambient waterbody. A mixing zone is an allocated impact zone where water quality criteria can be exceeded as long as

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[183] *Topanga Assn. for a Scenic Community v. County of Los Angeles* (1974) 11 Cal.3d 506, 515 (*Topanga*); see *In Re Petition of the City and County of San Francisco, et al.*, State Board Order No. WQ 95-4 (Sept. 21, 1995), pp. 10, 13.

[184] *Topanga, supra*, 11 Cal.3d, pp. 514-515.

[185] Subsection B below.

[186] Subsection A below.

[187] Subsections C, D below.

acutely toxic conditions are prevented."[188] Similarly, the Permit defines a mixing zone as, "[a] limited volume of receiving water that is allocated for mixing with a wastewater discharge where water quality criteria can be exceeded without causing adverse effects to the overall water body."[189] Thus, when a mixing zone is allowed, water quality criteria may be exceeded within the mixing zone and applicable water quality criteria and/or objectives are met at the edge of the mixing zone.[190]

When determining if the allowance of mixing zones are appropriate, the Regional Board relies on provisions in the SIP, Basin Plan, and TSD.[191] Overall, in allowing mixing zones, beneficial uses need to be protected and the overall integrity of the water body should not be compromised.[192] Compliance with water quality criteria/objectives at the edge of mixing zones will ensure that beneficial uses are protected. There is no dispute that when considering application of U.S. EPA's ammonia criteria that such criteria are met at the edge of the mixing zones supported by the District. However, the Regional Board relied improperly on effects far downstream of concentrations well below U.S. EPA's ammonia criteria to find that allowance of mixing zones for ammonia would affect beneficial uses and compromise the integrity of the water body. Unless and until other criteria are properly adopted or determined, mixing zones must be allowed.

2. The Regional Board's Denial Based on the SIP Is Unrelated to Acute and Chronic Mixing Zones[193]

The September Tentative Permit included the first ten of eleven factors now cited for denying the ammonia mixing zones that would result in compliance with the U.S. EPA ammonia

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[188] U.S. EPA *Technical Support Document for Water Quality-Based Toxics Control* (EPA/505/2-90-001) (March 1991) (TSD), p. glossary XX.

[189] Permit, p. A-4.

[190] See 2000 Final Functional Equivalent Document (FED) for the SIP, p. V-45, fn. 15 ("If a mixing zone is allowed, the 'point of application' of criteria/objectives is at the edge of an allowed mixing zone; . . . . ").

[191] Permit, pp. F-28 to F-30.

[192] 2000 Final FED for the SIP, p. V-45; see also Basin Plan, p. IV-16.00; TSD, pp. 33-34.

[193] There is a question as to the applicability of the SIP to ammonia as ammonia is not a priority pollutant. Regardless, the Regional Board's denial under the SIP or similar conclusions under the Basin Plan are improper.

criteria at the edge of the mixing zones.[194] In comments, the District explained that none of the ten were justification for denial of the mixing zone. The District further explained that, in fact, only three of the reasons even potentially had anything to do with toxicity in the mixing zones. The District further explained that if effluent limitations for ammonia were to be developed based on any of the issues identified, that that must occur in accordance with applicable law.[195] The revised November Tentative Permit added an additional conclusion: that the mixing zone would not meet three SIP criteria.[196] This is erroneous.

When allowing a mixing zone for an incompletely mixed discharge, the SIP establishes eleven different criteria.[197] Of the eleven criteria, the Regional Board determined that for ammonia three criteria are not met.[198] However, the Permit fails to articulate or explain how or why the allowance of acute and chronic mixing zones for ammonia is related to the three criteria. More specifically, the SIP states: "a mixing zone shall not: (1) compromise the integrity of the entire water body; . . . (4) adversely impact biologically sensitive or critical habitats, including but not limited to, habitat of species listed under federal or state endangered species laws; (5) produce undesirable or nuisance aquatic life . . . ."[199] In this case, the District provided evidence to show that in fact the granting of acute and chronic aquatic life mixing zones for ammonia will not violate the three criteria specified.

Further, while the granting of a mixing zone is within the Regional Board's discretion, denial of mixing zones may not be arbitrary and the Regional Board must consider all information in the record, the cost to the discharger, and lack of harm *associated with such* a mixing zone.[200]

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[194] September Tentative Permit, pp. F-54 to F-56.

[195] District's October 2010 Comments and Evidence Letter, pp. 44-47. In general, these comments remain applicable: issues addressed there are also included in the substance of this Statement of Points and Authorities. The District does reiterate specifically that the fact that the SRWTP is a major source of ammonia to the Delta (Permit, p. F-56(2)) is not a basis for denying a mixing zone.

[196] See November Redline Tentative Permit, pp. F-40 to F-41, F-58 to F-54; Permit, p. F-27.

[197] SIP, p. 17.

[198] Permit, p. F-40.

[199] SIP, p. 17, underline omitted.

[200] *In the Matter of the Petition of Yuba City*, State Board Order WQO 2004-0013 (July 22, 2004), p. 12 ("While granting a mixing zone is discretionary, in reaching our conclusion we consider that the Regional Board did not fully consider information in the record, the high cost to meet the effluent limitations without allowing this dilution credit,

It is beyond debate that the Regional Board's denial has nothing to do with any harm associated with the mixing zones themselves and there exists no evidence that allowing the mixing zones for ammonia will result in harm to beneficial uses or the environment.[201] Rather, the denial of the mixing zones was simply a vehicle to require full nitrification related to the SRWTP's discharge. Consider, for example, what the specific effluent limitations for ammonia would be if there were no U.S. EPA ammonia criteria or if the calculation of end of pipe criteria happened to produce different values than the effluent limitations in the Permit. The limitations would undoubtedly be different than those in the Permit itself. This reinforces that the denial of the mixing zones is unrelated to the mixing zones themselves, and improper.

In general, the Permit and its supporting documents do not include any explanation or identify any evidence as to how acute and/or chronic mixing zones for ammonia fail to meet the three specified criteria. This alone is unlawful and mere conclusions are not proper and do not satisfy the Regional Board's obligations to set forth findings based on evidence in the record and bridge the analytic gap between the raw evidence and conclusions.[202] To the contrary, evidence in the record exists to show that acute and/or chronic mixing zones for ammonia meet these three specified criteria as well as all the other criteria.

In fact, the effort to rely on SIP criteria is, on a legal level, an end-run of the Regional Board's obligation to bridge the analytical gap between the evidence and the ordered effluent limitations. It is also an end-run of the Regional Board's obligations with respect to implementation of narrative water quality objectives and the numeric objective for dissolved oxygen, as discussed further below.

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and the lack of evidence of any harm associated with such a mixing zone."); see also *In the Matter of the Petitions of East Bay Municipal Utility District and Bay Area Clean Water Agencies*, State Board Order WQO 2002-0012 (July 18, 2002), pp. 15-16 ("For example, if the background concentration were below water quality objectives, and aquatic organism tissue concentrations were below protective concentration thresholds, then some allowance of dilution might be appropriate—particularly where it is clear that source control measures will not result in attainment of effluent limits without dilution credit and advance treatment would be required.").

[201] See section VI.B, *post*.

[202] *Topanga, supra,* 11 Cal.3d, p. 515; see State Board Order WQ 95-4, *supra*, pp. 10, 13; see also State Board Order WQO 2004-0013, *supra*, p. 12 (regional board must consider all the information in the record).

Pursuant to federal regulatory requirements, when establishing effluent limitations due to a finding that the effluent has reasonable potential to violate a narrative criteria (e.g., toxicity), as was done here, the Regional Board must use a calculated numeric water quality criteria derived from, ". . . a proposed State criterion, or an explicit State policy or regulation interpreting its narrative water quality criterion, supplemented with other relevant information which may include: EPA's Water Quality Standards Handbook, October 1983, risk assessment data, exposure data, information about the pollutant form the Food and Drug Administration, and current EPA criteria documents; . . . ."[203] The effects levels identified in preliminary studies referenced in the Permit, for example, are not proposed state criteria, thus the Regional Board must rely on a regulation that allows for the interpretation of narrative objectives.[204]

With respect to interpreting narrative objectives pursuant to an explicit state policy or regulation, the Basin Plan includes a policy that requires the Regional Board to consider, ". . . on a case-by-case basis, direct evidence of beneficial use impacts, all material and relevant information submitted by the discharger and other interested parties, and relevant numerical criteria and guidelines developed and/or published by other agencies and organizations . . . ."[205]

There exist in the Basin Plan narrative water quality objectives that relate to the type of impacts alleged to occur from low concentrations of ammonia far downstream of the discharge.[206]

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[203] 40 C.F.R. § 122.44(d)(1)(vi)(A).

[204] See, e.g., section VI.B.1.b.iii, *post*.

[205] Basin Plan, p. IV-17.00.

[206] Narrative objectives potentially implicated by the ammonia-related issues discussed in the Permit include:

> **Biostimulatory Substances**
> Water shall not contain biostimulatory substances which promote aquatic growths in concentrations that cause nuisance or adversely affect beneficial uses.
> * * *
> **Chemical Constituents**
> Waters shall not contain chemical constituents in concentrations that adversely affect beneficial uses . . . .
> * * *
> **Toxicity**
> All waters shall be maintained free of toxic substances in concentrations that produce detrimental physiological responses in human, plant, animal, or aquatic life. This objective applies regardless of whether the toxicity is caused by a single substance or the interactive effect of multiple substances. (Basin Plan, pp. III-3.00, III-8.00.)

Again, setting aside shortcomings of technical analysis, the Regional Board simply skipped over its obligations related to implementation of narrative objectives.[207]

a. Acute and Chronic Aquatic Life Mixing Zones For Ammonia Will Not Compromise the Integrity of the Entire Water Body

The District provided evidence to support an acute aquatic life mixing zone that extends 60 feet downstream, and a chronic aquatic life mixing zone that extends 350 feet downstream.[208] With respect to an acute aquatic life mixing zone, the Sacramento River is approximately 600 feet wide while the proposed mixing zone is only 300 feet wide (the width of the diffuser) by 60 feet downstream.[209] Further, the acute mixing zone begins along the bottom of the river at the submerged diffuser and would not reach the surface of the river.[210] In comparison, the Sacramento River extends over 40 miles downstream from the discharge to San Francisco Bay. The TSD states, "[i]f the total area affected by elevated concentrations within all mixing zones combined is small compared to the total area of a waterbody (such as a river segment), then mixing zones are likely to have little effect on the integrity of the waterbody as a whole, provided that they do not impinge on unique or critical habitats."[211] Accordingly, because the combined mixing zones for the SRWTP's discharge are small in comparison to the river segment, there is expected be little effect on the integrity of the water body as a whole (unlike, for example, granting a mixing zone in an EDW that occupies the entire water body). Thus, an acute aquatic life mixing zone would not compromise the integrity of the entire water body. Likewise, the chronic aquatic life mixing zone of 350 feet would also not compromise the integrity of the entire water body because the mixing zones combined are small in comparison to the river segment in question.

Under any circumstances, and as discussed further below, the Regional Board did not provide findings that ammonia (in contrast to the mixing zone) impairs the entirety of the

[207] See, e.g., section VI.B.1.b.iii, *post*.

[208] Permit, pp. F-112, J-9; see also District's October 2010 Comments and Evidence Letter, p. 80.

[209] District's October 2010 Comments and Evidence Letter, p. 80.

[210] District's October 2010 Comments and Evidence Letter, p. 80.

[211] TSD, p. 34.

Sacramento River and Delta.[212] The Regional Board's reliance on the SIP provisions is an obvious avoidance of its obligations with respect to establishing effluent limitations when writing permits and implementing narrative criteria and objectives and the dissolved oxygen objective.

b. Acute and Chronic Aquatic Life Mixing Zones for Ammonia Will Not Adversely Impact Biologically Sensitive or Critical Habitats, Including, But Not Limited To, Habitat of Species Listed Under Federal or State Endangered Species Laws

As clearly indicated in the Permit, the Regional Board is concerned with far field impacts—not those in the near field.[213] However, as discussed below, the Permit fails to include findings supported by substantial evidence in the record to show that discharges from the SRWTP are adversely impacting biologically sensitive or critical habitats—inside or outside of the acute and chronic aquatic life mixing zones.[214] Considering that SRWTP discharges are not impacting biologically sensitive or critical habitats, and the lack of evidence indicating otherwise, the Regional Board has improperly denied acute and chronic mixing zones for ammonia based on this criterion. Most importantly with regard to the SIP criterion relied upon, the deficiency in the Permit is that the alleged impacts are *outside* the mixing zone. The Regional Board has not made findings to support that the *mixing zones* themselves have adverse impacts, but that *downstream* concentrations have adverse effects. Setting aside technical deficiencies, the Regional Board bypassed its obligations related to implementation of narrative objectives or criteria, consideration of all information in the record, and to make findings that are supported by evidence in the record.[215]

c. Acute and Chronic Aquatic Life Mixing Zones for Ammonia Will Not Produce Undesirable or Nuisance Aquatic Life

The Regional Board also improperly denied mixing zones by claiming that the establishment thereof would produce undesirable or nuisance aquatic life. The Regional Board

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[212] *Topanga, supra,* 11 Cal.3d, p. 515; see also State Board Order WQO 2004-0013, *supra*, p. 12.

[213] See Permit, pp. F-40 to F-41; see also Staff Report, p. 13.

[214] See, e.g., section VI.B.1.a (no toxicity to delta smelt); see also section VI.B.1.b (discussion on copepods).

[215] See section VI.B, *post*; see also State Board Order WQO 2004-0013, *supra*, p. 12.

fails to explain in any manner how it reached this conclusion. To the extent the Regional Board may be referring to effects on copepods, diatom primary production, and/or shifts in algal species (discussed further below), there exist tremendous uncertainty with respect to finding that ammonia discharges from the SRWTP are causing acute and/or chronic toxicity to copepods, inhibiting diatom primary production, or causing shifts in algal species.[216] As is well-documented below, the preliminary study results associated with acute toxicity to copepods is not based on results at environmentally relevant levels of pH, the chronic toxicity effects levels are based on preliminary, hearsay evidence from unpublished works, and, there is no real evidence that indicates SRWTP discharges are the cause of inhibition to diatom primary production and/or causing a shift in algal species.[217] Accordingly, as discussed below, because the Regional Board's findings with respect to copepods, inhibition to diatom production, and shifts in algal species are not supported by evidence in the record, the Regional Board cannot use such findings to support its denial of mixing zones for ammonia.

Further, the District, like all other dischargers that are granted acute and chronic mixing zones, must ensure that receiving water quality criteria are met outside the mixing zones. As is shown in the District's dynamic modeling studies, and as acknowledged by the Regional Board, water quality criteria based on U.S. EPA's ammonia criteria are met outside the mixing zones.[218] If in the future appropriate water quality criteria for the protection of copepods, diatoms, and/or shifts in algal species are developed, the Regional Board maintains the authority to re-open the Permit and adopt new effluent limitations accordingly.[219] However, until such time that other criteria are appropriately developed, the Regional Board cannot arbitrarily deny mixing zones based on preliminary study results and speculative hypothesis.

Finally, again, the Regional Board's use of these pseudo-criteria is *unrelated* to the mixing zones. If there is nuisance aquatic life as a result of low ammonia concentrations downstream of

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[216] See section VI.B.1, *post*; Permit, p. F-56, ¶¶ (1), (3), (4), (5), (6).

[217] See section VI.B.1, *post*.

[218] Staff Report, pp. 6, 13.

[219] See Permit, p. 24.

the discharge, the Regional Board must interpret the narrative objective(s) implicated, and the Regional Board must comply with federal regulations and the Basin Plan when doing so. As stated previously, even if one *accepts* that ammonia at lower concentrations has effects in the far downstream areas, this is unrelated to the mixing zones themselves. The Regional Board is required to determine reasonable potential and develop numeric effluent limits based on the applicable objective. Here, the Regional Board merely denied mixing zones for reasons that do not relate to the mixing zones themselves.

B. The Regional Board's Findings For Denial of Mixing Zones Are Not Supported by Evidence in the Record

The Permit readily admits that acute and chronic aquatic life mixing zones comply with the SIP and the Basin Plan), except for ammonia.[220] With respect to ammonia, as discussed above, the Permit claims that the SIP is not satisfied because an acute mixing zone for ammonia would: (1) compromise the integrity of the entire body; (2) adversely impact biologically sensitive or critical habitats, including, but not limited to, habitat of species listed under federal or state endangered species laws; and (3) produce undesirable or nuisance aquatic life.[221] Specifically, the Permit claims that these elements of the SIP have not been met "because ammonia discharges from the Facility have been shown to be negatively affecting the receiving water far downstream of the discharge within the Delta, not just the areas defined by the requested mixing zone."[222] The Permit also includes ten other findings (which are supposedly discussed in detail in Attachment J) as to why denying dilution credits for ammonia is appropriate.[223] However, the findings in general and the information in Attachment J are not supported by evidence in the record. Further, in some cases, the evidence allegedly relied on by the Regional Board is not actually in the record and is not publicly available. Finally, as

[220] Permit, pp. F-35 to F-38.

[221] Permit, p. F-40.

[222] Permit, pp. F-40 to F-41.

[223] Permit, pp. F-56 to F-57.

discussed throughout, even if the findings all were accurate, the Regional Board has not complied with applicable law in establishing the specific effluent limitations in the Permit.

1. Findings Regarding Far Field Aquatic Life Impacts Are Not Supported by Evidence in the Record

As the written testimony and hearing testimony of Dr. Diana Engle describes, over recent years, there has been a series of hypotheses advanced concerning effects of ammonia from the SRWTP on beneficial uses downstream:

> Over the last three years, a series of hypotheses has cropped up regarding ammonia's potential effects on aquatic life in the delta. Agencies and interested parties have energetically funded research addressing these hypotheses which has been repeatedly evaluated at workshops, by independent panels, and through various State and federal processes that are currently underway.
>
> As detailed in the district's comments, none of the independent reviews have revealed a consensus that ammonia is a key driver of ecological problems in the delta, including the pelagic organism decline. This slide [SRCSD Hearing Exhibits, powerpoint slide 17] condenses some of the key points about ammonia contained in my testimony and in the district's comments. It illustrates a pattern of investigation that re-enforces the importance of distinguishing between hypothesis and facts. Several hypotheses asserted as facts a short time ago in some circles are no longer supported by available information from the delta.[224]

Indeed, and despite suggestions by Regional Board staff that there is some type of consensus around effects of ammonia and at low concentrations in the Delta, there are only hypotheses and uncertainty.[225] The State Board itself examined the issue just last year, convened an "other stressors" panel in connection with its informational proceeding on Delta flow issues, and concluded only that more study is appropriate.[226]

Nevertheless, the Regional Board imposed costly regulation on the District related to ammonia. As Dr. Engle explained, in so doing, the Regional Board also relied in key areas on

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[224] Hearing Transcript, p. 187:7-24. Dr. Engle also provided written testimony reflecting material stated in the District's October 2010 Comments and Evidence Letter. (Sacramento Regional Wastewater Treatment Plant NPDES Permit Renewal, [Written] Testimony/Comments of Diana L. Engle, Ph.D., of Larry Walker Associates on the Potential Roles of Ammonia and Nutrient Ratios in the Upper San Francisco Estuary (Engle Written Testimony), p. 4; District's October 2010 Comments and Evidence Letter, pp. 16-38.)

[225] See District's October 2010 Comments and Evidence Letter, pp. 16-38.

[226] State Water Resources Control Board (2010) Development of Flow Criteria for the Sacramento-San Joaquin Delta Ecosystem. August 3, 2010 (SWRCB 2010); see also District's October 2010 Comments and Evidence Letter, pp. 19-20.

highly preliminary research, undocumented or poorly documented field and lab work, and unreviewed or publicly unavailable information.[227] The Regional Board was too eager to find a culprit rather than base a decision on sound science. It improperly denied mixing zones for the U.S. EPA ammonia criteria based on logic that is not supportable from a scientific or regulatory perspective.

The Permit, preceding the SIP determination, includes several specific findings with respect to alleged far field aquatic life impacts supposedly caused by discharges from the SRWTP:

- Recent studies suggest that ammonia at ambient concentrations in the Sacramento River, Delta, and Suisun Bay may be acutely toxic to native *Pseudodiaptomus forbesi (copepod).*
- Recent studies provide evidence that ammonia from the SRWTP discharge is contributing to inhibition nitrogen uptake by diatoms in Suisun Bay.
- Ammonia, along with the clam *Corbula*, and high turbidity are attributed to reducing diatom production and standing biomass in the Suisun Bay.
- Downstream of the discharge point, ammonia may be a cause in the shift of the aquatic community from diatoms to smaller phytoplankton species that are less desirable as food species.
- Regardless of whether ammonia is directly or indirectly contributing to the pelagic organism decline (POD), ammonia is shown to affect adult *Pseudodiaptomus forbesi* reproduction at concentrations greater than or equal to 0.79 mg/L. And nauplii and juvenile *Pseudodiaptomus forbesi* are affected at ammonia concentrations greater to or equal 0.36 mg/L. These ammonia concentrations can be found downstream of the discharge. The beneficial use protection extends to all aquatic life and not limited to pelagic organisms.[228]

[227] Engle Written Testimony, p. 4; Hearing Transcript, pp. 188:13-193:5; SRCSD Hearing Exhibits, PowerPoint slides 17-19.

[228] Permit, p. F-56.

Attachment J of the Permit provides discussion that is the presumed basis for the above conclusions, and addresses three alleged connections between ammonia in SRWTP effluent and the POD: "(1) inhibiting diatom primary production in the Sacramento River downstream of the discharge point, in Suisun Bay and in the Delta, (2) causing acute and/or chronic toxicity to delta smelt and *Pseudodiaptomus forbesi*, an important food organism for larval and juvenile fish, and (3) causing a shift in the algal community from nutritious species of diatoms to less desirable forms like *Microcystis (blue green algae)*."[229] However, the evidence relied on by the Regional Board does not support the Permit's findings, or at most, is uncertain and supports only that further study is warranted. In either case, as shown below, the evidence fails to support Permit limits without the consideration of dilution that then require full nitrification of effluent from the SRWTP.

a. Evidence in the Record Demonstrates That Ammonia Is Not Causing Acute or Chronic Toxicity to Delta Fish

As acknowledged in Attachment J of the Permit, the evidence indicates that ambient ammonia concentrations throughout the upper San Francisco Estuary (SFE) are not high enough to cause acute toxicity to delta smelt or the wide range of aquatic organisms explicitly protected by current U.S. EPA ammonia criteria.[230] This characterization of ambient conditions applies not only to the POD years (2002 onward), but also to the entire 35-year period for which long-term monitoring data are available, and applies to the entire reach of the Sacramento River below the SRWTP discharge (e.g., River Mile 44 and points downstream).[231]

The U.S. EPA acute criterion for ammonia that applies to water bodies with salmonids present was specifically derived to protect rainbow trout.[232] Because repeated rounds of testing

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[229] Permit, p. J-1.

[230] See Permit, p. J-2; see also Staff Response to Comments, p. 20 ("Central Valley Water Board staff concur that ammonia levels after mixing with the receiving water are not sufficiently elevated to cause toxicity to Delta smelt."); see also District's October 2010 Comments and Evidence Letter, pp. 23-25.

[231] District's October 2010 Comments and Evidence Letter, p. 23; Engle Written Testimony, p. 4.

[232] U.S. EPA. 1999. *1999 Update of Ambient Water Quality Criteria for Ammonia.* EPA 822-R-99-014. United States Environmental Protection Agency, December 1999 (U.S. EPA 1999).

indicate that delta smelt have similar acute sensitivity to ammonia as rainbow trout,[233] the U.S. EPA acute criterion is appropriately considered protective of delta smelt. Attachment J references two recent studies that indicate ambient concentrations of ammonia throughout the estuary (including in the Sacramento River below the SRWTP) meet the U.S. EPA ammonia criteria:

- Engle[234] compared U.S. EPA acute and chronic criteria with ambient ammonia concentrations from almost 12,000 grab samples taken throughout the freshwater and brackish estuary from 1974 to the present. The dataset included monitoring results from the Interagency Ecological Program (IEP), U.S. Geological Survey (USGS), Department of Water Resources (DWR), U.S. Fish and Wildlife Service (USFWS), the District, and the University of California (UC) Davis Aquatic Toxicology Lab.[235] In this large dataset, ammonia concentrations in the ambient waters *never* exceeded the U.S. EPA acute criterion, and the chronic criterion was exceeded *only twice* in the available record (one sample each in 1976, 1991). Margins of safety were large: the chronic criterion exceeded ambient concentrations by average factors of 40 and 80 in the brackish and freshwater estuary, respectively.

[233] Werner, I., L.A. Deanovic, M. Stillway, and D. Markiewicz. 2008. *The Effects of Wastewater Treatment Effluent-Associated Contaminants on Delta Smelt*. Final Report to the Central Valley Regional Water Quality Control Board. September 26, 2008 (Werner et al. 2008).

Werner, I., L.A. Deanovic, M. Stillway, and D. Markiewicz. 2009. *Acute toxicity of Ammonia/um and Wastewater Treatment Effluent-Associated Contaminant on Delta Smelt - 2009*. Final Report to the Central Valley Regional Water Quality Control Board. December 17, 2009 (Werner et al. 2009).

[234] Engle, D. 2010a. Testimony before State Water Resources Control Board Delta Flow Informational Proceeding. Other Stressors-Water Quality: Ambient Ammonia Concentrations: Direct Toxicity and Indirect Effects on Food Web. Testimony submitted to the State Water Resources Control Board, February 16, 2010 (Engle 2010a).

[235] See Figure 1 (Map of monitoring locations and samples taken at each monitoring location).

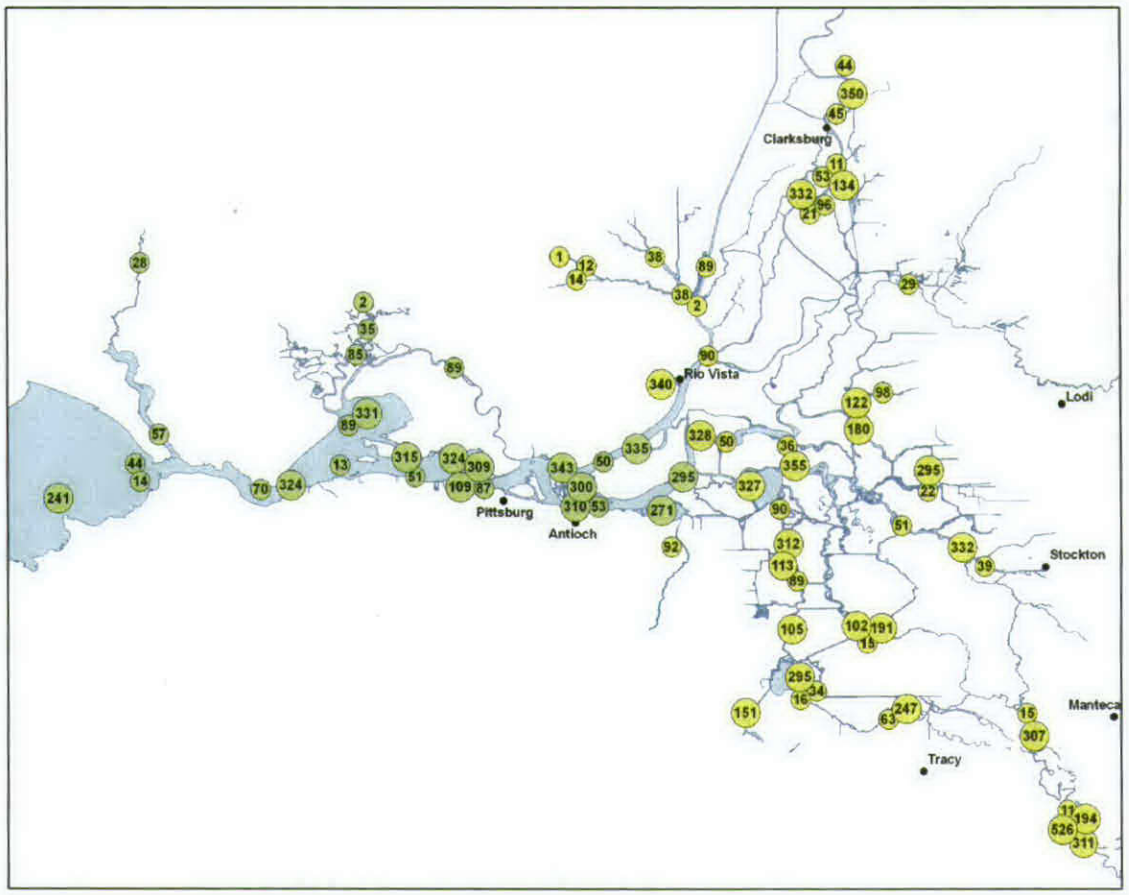

Figure 1. Long-term estuarine (green symbols) and freshwater (yellow symbols) monitoring stations in the Upper SFE provide co-occurring measurements of pH, water temperature, and total ammonia. Values inside symbols are numbers of monthly or bi-weekly grab samples taken during the period 1974-2010. Stations were classified as estuarine or freshwater based on procedures specified in the California Toxics Rule. Figure is from Engle 2010a.[236]

- Regional Board staff conducted ambient water sampling at 21 sites in the freshwater Delta between March 2009, and February 2010.[237] None of staff's measurements of ammonia exceeded the U.S. EPA ammonia criteria for both acute and chronic conditions. In addition, Regional Board staff screened their ambient data using an ultra-conservative, hypothetical chronic criterion for delta smelt created by using the highest of three Acute to Chronic Ratios (ACRs) (20.7, 9.7, 6.5) for fathead minnow contained in the U.S. EPA criteria.[238] Although such use of an ACR of 20.7 conflicts

[236] Engle 2010a.

[237] Foe, C., A. Ballard, and S. Fong. 2010. Nutrient Concentrations and Biological Effects in the Sacramento-San Joaquin Delta. Central Valley Regional Water Quality Control Board, July 2010 (Foe et al. 2010).

[238] See U.S. EPA 1999.

with the U.S. EPA interpretation of fathead minnow data,[239] and although U.S. EPA does not use ACRs for single species to derive chronic criteria,[240] the hypothetical chronic criterion so derived was not exceeded by any of the ambient concentrations measured in the Regional Board study.

Despite the overwhelming evidence in the record that ammonia in the receiving water does not exceed acute and chronic criteria outside the District-requested mixing zones, the Permit reports an opinion expressed by Werner et al. (2008, 2009)[241] that repeated excursions of pH above 8.0 in the Delta may equate to a potential for chronic toxicity for delta smelt.[242] This gross generalization is not supported by co-occurring measurements of ambient pH and un-ionized ammonia in the Delta.[243] Because total ammonia concentrations and water temperature vary widely within pH strata across the estuary, ambient pH alone is an inappropriate basis for gauging whether un-ionized ammonia concentrations are of concern. For example, plots of pH versus un-ionized ammonia for both the brackish estuary and freshwater Delta for the years 2000-2010[244] indicate that un-ionized ammonia concentrations span the full range of ambient values (low to high) when pH is greater than 8.0.[245]

[239] U.S. EPA used the geometric mean of all three available ACRs (20.7, 9.7, 6.5) to characterize the acute:chronic sensitivity of fathead minnow (*Pimephales*), not the highest of the available ACRs (20.7). This was done because U.S. EPA considered the test that yielded the ACRs of 20.7 to be flawed. (See U.S. EPA 1999, pp. 53-54.) The resulting Genus Mean ACR (GMACR) for fathead minnow is 10.86.

[240] Five GMACRs for fish genera have survived vetting by U.S. EPA and were published in both the 1999 (see reference above) and 2009 (U.S. EPA, Draft 2009 Update Aquatic Life Ambient Water Quality Criteria for Ammonia – Freshwater. EPA-822-D-09-001. December 2009) U.S. EPA ammonia criteria documents (*Pimephales* - 10.86, *Catostomus* - <8.33, *Ictaluris* - 2.712, *Ictaluris* - 7.671, *Micropterus* - 7.688). All five GMACRs are used by U.S. EPA to derive the chronic ammonia criterion—not just the GMACR for fathead minnow.

[241] Werner et al. 2008; Werner et al. 2009.

[242] Permit, p. J-2.

[243] District's October 2010 Comments and Evidence Letter, p. 25; Engle Written Testimony, p. 4; see also Hearing Transcript, p. 188:13-25.

[244] Sacramento Regional County Sanitation District Comments on Draft Nutrient Concentration and Biological Effects in the Sacramento-San Joaquin Delta, Central Valley Regional Water Quality Control Board, May 2010. Letter submitted to Chris Foe, Central Valley Regional Water Quality Control Board, June 14, 2010 (SRCSD 2010).

[245] See Figure 2.

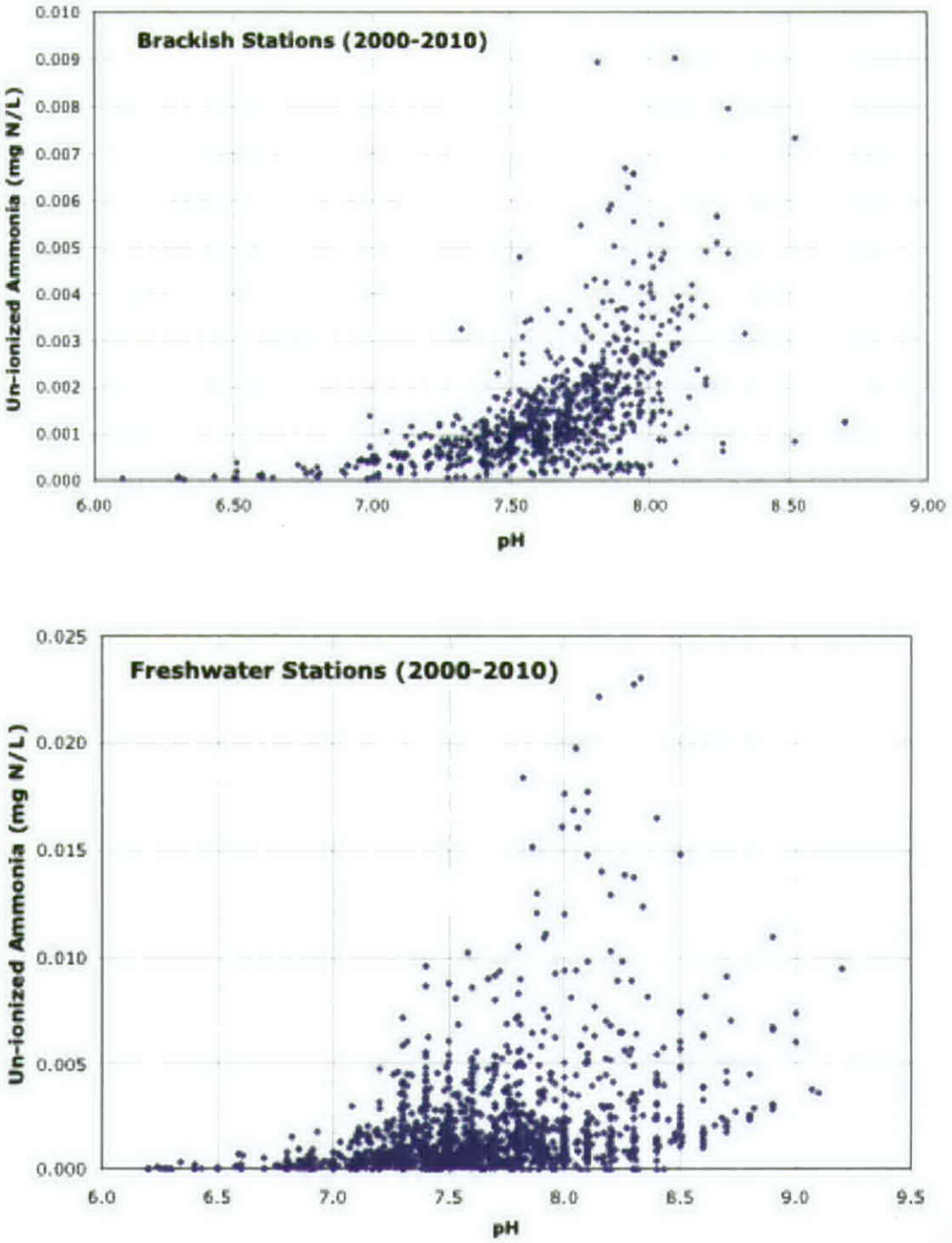

Figure 2. Relationship between field pH and un-ionized ammonia (mg N/L) at brackish stations (upper panel) (Sherman Island to San Pablo Bay) and at freshwater stations (lower panel) in the upper SFE during 2000-2010. Dataset is described in Engle & Lau 2010[246]. Data from 18 stations used by the IEP, DWR-MWQI (Municipal Water Quality Investigation), and UC Davis Aquatic Toxicology Lab POD project are represented. Figure is from SRCSD 2010.

[246] Engle, D.L., and G. Lau. 2010. Does Ammonia Exceed Toxicity Thresholds in the Upper San Francisco Estuary? A Comparison of Ambient Data and Toxicity Thresholds for 1974-2010. Interagency Ecological Program (IEP) Annual Workshop, Sacramento, CA (Engle & Lau 2010).

In any case, all of the un-ionized ammonia concentrations in the dataset, even those for pH>8.0, are well below the 96 hour LC10s[247] for 47-day old delta smelt (0.084, 0.105 mg N/L un-ionized ammonia).[248] Thus, the reference in Attachment J of the Permit to the suggestions that ammonia from the SRWTP may be causing chronic toxicity to delta smelt and other Delta fish is not supported by the evidence.[249]

b. The Permit Findings Regarding Acute and/or Chronic Toxicity to Delta Copepods (*Eurytemora affinis* and *Pseudodiaptomus forbesi*) Are Based on Preliminary and Questionable Study Results That Do Not Constitute Appropriate Water Quality Criteria

Although the Permit acknowledges that the evidence indicates ammonia is not causing acute and/or chronic toxicity to delta smelt and similar species, the Permit refers to new studies to claim that U.S. EPA's recommended ammonia criteria may not be protective of other Delta species.[250] Separate water quality criteria for these Delta species (*Eurytemora affinis* (*E. affinis*) and *Pseudodiaptomus forbesi (P. forbesi)*) do not currently exist. In the absence of such criteria, the Permit relies heavily on preliminary studies conducted by Dr. Swee Teh to find that ammonia in the effluent is causing acute and/or chronic toxicity to Delta copepods.[251] However, the results in Dr. Teh's studies are questionable when compared to environmentally representative conditions. The use of various effect levels from these preliminary studies would be an improper interpretation of the narrative toxicity water quality objective. Further, the preliminary results are in part improper evidence that was objected to during the Regional Board's hearing and should not have been considered.[252]

[247] LC10 is the concentration at which it is estimated there is 10 percent mortality.

[248] Werner et al. 2009.

[249] Ultimately, the Permit findings do not express concurrence with this suggestion. (See Permit, p. J-2.) It is in any event erroneous, as discussed above.

[250] Permit, p. J-2.

[251] Permit, pp. J-2 to J-3.

[252] See section VI.B.1.b.iv, *post*.

i. The Permit Relies on a Sub-Set of Study Results That Uses Misrepresentative pH

The Permit states that Sacramento River water below the discharge contains ammonium concentrations that can cause acute toxicity to either *E. affinis and P. forbesi* based on test results from Teh et al. 2009.[253] Relying on Teh et al. 2009, the Permit references that ten percent mortality occurred to both *E. affinis* and *P. forbesi* at ambient concentrations present in the river below the SRWTP.[254] However, this statement and the associated reliance on Teh et al. 2009 are contrary to previous Regional Board staff interpretations of the same test results. In reviewing the test results, Dr. Chris Foe noted that the test pH associated with toxicity in Dr. Teh's experiments (i.e., 7.2) was not representative of ambient pH levels in the Sacramento River.[255] In a technical memorandum to the Regional Board, Dr. Foe states that:

> Ten percent mortality occurred to both species at ambient ammonia concentrations present in the river below the SRWTP. *However, toxicity was only observed at a lower pH (7.2) than commonly occurs in the River (7.4 to 7.8).* Toxicity was not observed when toxicity testing was done at higher pH levels.[256]

When environmentally representative pH is considered, test results involving *E. affinis* and *P. forbesi* do not indicate a potential for acute toxicity in the Sacramento River or the Delta. The LC10s for *E. affinis* and *P. forbesi* at the most environmentally relevant test pH (pH 7.6) are about 5 mg N/L total ammonia.[257] This concentration (5 mg N/L) is more than five times higher than the maximum concentrations observed in the Sacramento River during 16 field surveys conducted by the Regional Board from 2009-2010.[258] Further, the LC10s are higher than the

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[253] Permit, pp. F-56, J-2; Teh, S., S. Lesmeister, I. Flores, M. Kawaguchi, and C. Teh. 2009. *Acute Toxicity of Ammonia, Copper, and Pesticides to Eurytemora affinis and Pseudodiaptomus forbesi*. Central Valley Regional Water Quality Control Board Ammonia Summit, Sacramento, California, August 18-19, 2009 (Teh et al. 2009).

[254] Permit, p. J-2.

[255] Foe, C. 2009. *August 2009 Ammonia Summit Summary*. Technical Memo to Jerry Bruns and Sue McConnell, Central Valley Regional Water Quality Control Board, September 24, 2009 (Foe 2009).

[256] Foe 2009, p. 2, emphasis added.

[257] LC10s in Teh et al. (2009) were 5.02 and 5.16 mg N/L total ammonia for *E. affinis* and *P. forbesi*, respectively.

[258] Foe et al. 2010.

99.91 percentile of ammonia concentrations occurring 350 feet below the SRWTP diffuser.[259] In other words, ambient concentrations of total ammonia in the Sacramento River essentially never exceed the lowest acute thresholds (LC10s) thus far reported for *E. affinis* or *P. forbesi* for representative pH conditions.

With respect to the rest of the Delta, there is also no relevant evidence supporting a claim of acute toxicity for *E. affinis* or *P. forbesi*. None of the ambient total ammonia values measured by the Regional Board at 24 sites throughout the Delta exceeded the environmentally relevant LC10s for these two copepod species during 16 field surveys conducted 2009-2010, and most ambient concentrations were more than an order of magnitude lower than the LC10s.[260] When expressed as *un-ionized* ammonia, the environmentally relevant LC10s for the two copepod species (0.08 mg N/L un-ionized ammonia for both species at pH 7.6)[261] are well above the 99th percentile (i.e., 0.014 mg N/L un-ionized ammonia) of measured ambient concentrations of for the freshwater Delta for 2000-2010.[262] None of the Regional Board's measurements of total ammonia in the Delta during 2009-2010[263] exceeded the preliminary 96-hour Lowest Observed Effects Concentration (LOEC) for 3-day old nauplii of *P. forbesi* (1.23 mg N/L total ammonia) reported in a November 10, 2010, letter from Dr. Teh to Dr. Foe referenced in the Permit.[264] Only one of the ambient un-ionized ammonia measurements in the more extensive dataset illustrated in Figure 3 exceeds the nauplii LOEC when it too is expressed as un-ionized ammonia (0.03 mg N/L un-ionized ammonia at reported test conditions of pH 7.8 and temperature 20°C). Thus, when acute effects thresholds for environmentally representative pH values are compared to ambient

[259] Anti-Degradation Analysis for Proposed Discharge Modification to the Sacramento Regional Wastewater Treatment Plant, Draft, Larry Walker Associates (May 20, 2009) (Expansion ADA).

[260] Foe et al. 2010.

[261] Teh et al. 2009.

[262] See also Figure 3; Teh et al. 2009.

[263] Foe et al. 2010.

[264] Permit, p. J-3; see also section VI.B.1.b.iv, *post* (referenced letter was objected to and should be stricken from the record).

ammonia concentrations in the Delta, there is no evidence of acute toxicity to the most sensitive Delta species.[265]

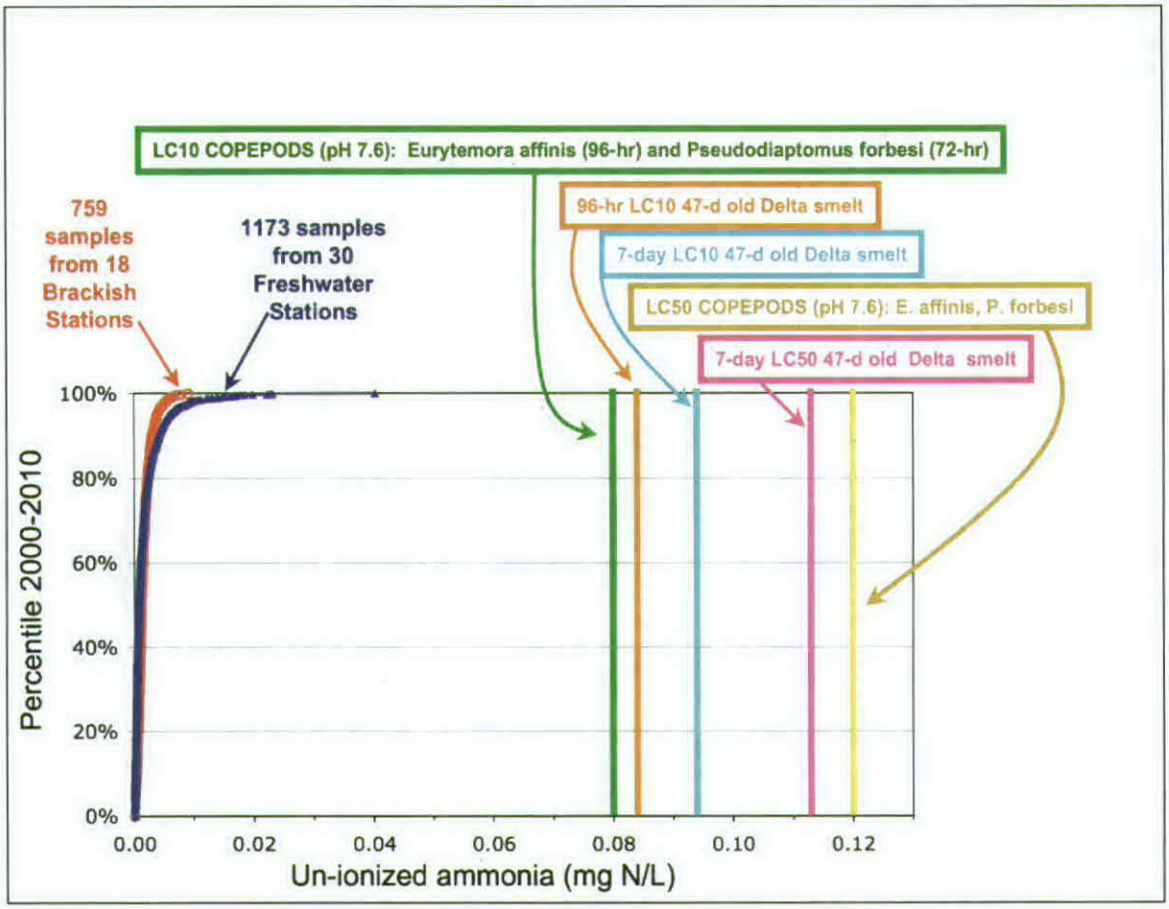

Figure 3. Ranked distribution of ambient concentrations of un-ionized ammonia from estuarine stations (red circles) and freshwater stations (blue triangles) in the upper SFE for 2000-2010. Monitoring stations are illustrated in Figure 1. Included are acute effects thresholds for un-ionized ammonia from exposure tests using delta smelt and the adult copepods *E. affinis* and *P. forbesi*. A preliminary 96-hour LOEC for juvenile *P. forbesi* (3-day-old nauplii, reported in Nov. 2010 (1.23 mg/L as total ammonia-N), not illustrated in the figure, equates to 0.03 mg N/L un-ionized ammonia at the reported test conditions (pH 7.8, 20°C).[266] Figure is adapted from Engle 2010a.[267]

[265] District's October 2010 Comments and Evidence Letter, p. 37; Engle Written Testimony, p. 4; Hearing Transcript, p. 188:6-12.

[266] Permit, J-7.

[267] Figure 3 in Engle 2010a was adapted by adding the LC10 and LC50 for *P. forbesi* from Teh et al. 2009.

ii. The Permit's Findings of Chronic Toxicity to Delta Copepods Are Based on Improper ACR Analysis and Preliminary Information

To find chronic toxicity to Delta copepods, the Permit relies on an ACR analysis and preliminary test results from Teh et al. 2009 and Teh et al. 2010, respectively.[268] With respect to the ACR approach, Dr. Teh used test results with a pH of 7.2 to calculate a hypothetical chronic criterion for the two copepod species.[269] However, as discussed above and further explained in Engle 2010b,[270] use of the lowest test pH biased the analysis. When the LC50s from exposures at *environmentally relevant* test pH (7.6)[271] are used in an analogous ACR analysis, the resulting hypothetical chronic criteria for the two copepod species are exceeded in only 4 out of 2,487 measurements of un-ionized ammonia from the upper SFE during the last decade.[272]

Using Dr. Teh's preliminary test results from an oral presentation (Teh et al. 2010) and an informal letter exchanged between the investigator and Regional Board staff in November 2010 (a month after the deadline for written comments on the September Tentative Permit),[273] the Permit finds *P. forbesi* affected by ammonia concentrations ≥0.36 mg/L.[274] The use of this preliminary effects threshold to find chronic toxicity is technically inappropriate for several reasons:

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[268] Permit, p. J-2; Teh, S., I. Flores, M. Kawaguchi, S. Lesmeister, and C. Teh. 2010. Full life-cycle bioassay approach to assess chronic exposure of *Pseudodiaptomus forbesi* to ammonia/ammonium. Oral presentation given to POD Contaminant Workteam, July 2010 (Teh et al. 2010).

[269] Teh et al. 2009. LC50s from his lowest test pH (7.2) were divided by an arithmetic mean of GMACRs for fish daphnids from U.S. EPA 1999.

[270] Engle, D. 2010b. Memorandum: Comments Regarding the Regional Board Staff Analysis of the 2009 Ammonia Summit. 20 p. January 13, 2010 (Engle 2010b).

[271] Based on IEP, USGS, and DWR monitoring data for the period 2000-2010, the median and mean pH for the brackish delta are 7.6 and 7.7, respectively, and the median and mean pH for the freshwater Delta are both 7.6. (Engle 2010b.)

[272] See Engle 2010b; Permit, p. J-2.

[273] November 10, 2010, letter from Dr. Swee Teh, University of California, Davis, to Dr. Chris Foe, RWQCB (November Teh Letter); see Permit, p. J-3.

[274] Permit, p. F-56.

- The test result concentration (0.36 mg/L total ammonia) does not represent an EC20[275] for the species. EC20s are the thresholds used by the U.S. EPA 1999 and 2009 for derivation of the chronic ammonia criterion.[276]
- The concentration referenced in the Permit (0.36 mg/L total ammonia) is from recent laboratory work that has not been written up in a report or manuscript for stakeholder or peer review.
- There are irregularities in the test results, which have not been explained. An inverse relationship was observed between toxicity and test pH, which is opposite from the expected responses for organisms included in the U.S. EPA ammonia database. A dose-response was not observed in the chronic test based on the number of nauplii surviving to adulthood.
- The tests were conducted with a novel test organism (a copepod species), for which there are no established protocols and no comparable test results from other laboratories.[277]

Considering the preliminary nature of the information, lack of review, and irregularities in test results, the 0.36 mg/L value is inappropriate for determining if ambient ammonia at this level causes chronic toxicity to copepods.

iii. Effect Levels From Preliminary Studies Are Inappropriate Water Quality Criteria

At the center of the Regional Board's finding here (i.e., acute and/or chronic toxicity to *P. forbesi*) is that, based on Dr. Teh's work, ammonia concentrations lower than criteria calculated from U.S. EPA ammonia criteria can have adverse effects. However, the use of effect

[275] The EC20 is a calculated effect level indicating the concentration of a parameter causing a 20 percent reduction in a measured effect compared to the control or reference condition. The measured effect is typically sublethal, such as reproduction (compared to lethality, which is the basis for LCx thresholds, such as LC50s). The EC20 is calculated using a regression model based on multiple test concentrations of the parameter, and is statistically more robust than hypothesis testing endpoints (such as the NOEC or LOEC).

[276] U.S. EPA 1999; U.S. EPA. 2009. Draft 2009 Update Aquatic Life Ambient Water Quality Criteria for Ammonia-Freshwater. EPA 822-D-09-001. United States Environmental Protection Agency, December 2009 (U.S. EPA 2009).

[277] District's October 2010 Comments and Evidence Letter, p. 38; Engle Written Testimony, p. 4.

levels from Dr. Teh's preliminary studies are unlawful under state and federal regulations for interpreting narrative criteria.

As discussed in section VI.A.2 above, when establishing effluent limitations due to a finding that the effluent has reasonable potential to violate a narrative criteria (i.e., toxicity), as was done here, the Regional Board must use a calculated numeric water quality criteria derived from, ". . . a proposed State criterion, or an explicit State policy or regulation interpreting its narrative water quality criterion, supplemented with other relevant information which may include: EPA's Water Quality Standards Handbook, October 1983, risk assessment data, exposure data, information about the pollutant form the Food and Drug Administration, and current EPA criteria documents; . . . ."[278] The effects levels identified in Dr. Teh's preliminary studies are not proposed state criteria, thus the Regional Board must rely on a regulation that allows for the interpretation of narrative objectives.

With respect to interpreting narrative objectives pursuant to an explicit state policy or regulation, the Basin Plan includes a policy that requires the Regional Board to consider, ". . . on a case-by-case basis, direct evidence of beneficial use impacts, all material and relevant information submitted by the discharger and other interested parties, and relevant numerical criteria and guidelines developed and/or published by other agencies and organizations . . . ."[279] The Basin Plan further provides that, "[i]n considering such criteria, the Board evaluates whether the specific numerical criteria, which are available through these sources and through other information supplied to the Board, are relevant and appropriate to the situation at hand and, therefore, should be used in determining compliance with the narrative objective."[280]

Here, the use of Dr. Teh's results does not comply with the Regional Board's policy for several reasons. First, as indicated above, Dr. Teh's results are from preliminary studies that are not yet published.[281] Second, the Regional Board has failed to conduct and document a case-by-

[278] 40 C.F.R. § 122.44(d)(1)(vi)(A).

[279] Basin Plan, p. IV-17.00.

[280] Basin Plan, p. IV-17.00.

[281] Hearing Transcript, pp. 192:20-193:5; 194:12-14; SRCSD Hearing Exhibits, PowerPoint slide 19; Teh et al. 2010.

case analysis to determine if the effects levels identified in Dr. Teh's studies are relevant and appropriate. For example, Attachment J of the Permit references Teh et al. 2009 in its discussion regarding acute ammonia toxicity but does not evaluate or discuss why these results are appropriate for interpreting the narrative toxicity water quality objective.[282] Had such an analysis occurred, the Regional Board should have found that the use of these results were not appropriate or relevant because the test pH associated with toxicity was not representative of ambient pH levels in the Sacramento River.[283]

Likewise, the results from Teh et al. 2009 and Teh et al. 2010, which were used to find chronic toxicity, are preliminary and unpublished, and no case-by-case evaluation was conducted to determine their applicability and relevance for interpreting narrative criteria and establishing effluent limitations.[284] Attachment J of the Permit summarizes Dr. Teh's preliminary results but does not explain why their application is relevant and appropriate here.[285] Had the Regional Board conducted the proper analysis, it should have found that the results are not appropriate at this time because: the test result concentration does not use an appropriate U.S. EPA threshold for deriving chronic criteria; the results are unpublished; there were unexplained irregularities in the test results; and, there are no established protocols for conducting such tests on copepods.[286] However, the Permit record is void of any such analysis except for statements made by Regional Board staff that they have reviewed the data.[287] Reviewing the data and putting material in the record does not constitute a case-by-case analysis of relevance and applicability.

Further, even if the preliminary work was a proper basis for implementing the narrative toxicity objective, the Permit fails to provide any logical connection between the adopted final limits and pseudo-water quality criteria used from Dr. Teh's preliminary studies.[288] Dr. Teh

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[282] Permit, p. J-2.

[283] See section VI.B.1.b.i, *supra*.

[284] See sections VI.B.1.b.ii, iii, *supra*.

[285] Permit, p. J-2.

[286] See sections VI.B.1.b.ii, iii, *supra*.

[287] Hearing Transcript, p. 411:4-6.

[288] See Permit, p. F-56.

identified a chronic effect level as ≥0.36 mg N/L. The Permit contains final limits calculated from the U.S. EPA ammonia criteria without consideration of dilution. There is no rationale or explanation in the Permit that connects the final limits with Teh's effect level. Further, during the Permit hearing, Regional Board staff effectively acknowledged that the specific final limits were actually unrelated to the reason for their adoption.[289]

Considering the lack of any case-by-case analysis and any connection between the calculated effluent limitations and Dr. Teh's pseudo criteria, the Regional Board failed to comply with state and federal regulations. Thus, the Regional Board's findings with respect to acute and/or chronic toxicity to copepods relying on work by Dr. Teh to interpret the narrative toxicity objective, and ultimately deny assimilative capacity, were arbitrary and capricious and must be voided.

iv. The State Board Should Strike Objected-To Hearsay Evidence That Was the Basis of a Finding, and the Finding Relying on That Hearsay Evidence

At the Regional Board hearing, the District objected to certain evidence that is the exclusive basis for certain findings in the Permit.[290] The objection was overruled.[291] For the reasons provided below, the State Board should determine that it was error to overrule the objection, strike the evidence, and strike the finding based exclusively on hearsay.[292]

As discussed herein, various hypotheses have evolved concerning effects of ammonia on the aquatic ecosystem. One of these, as characterized in the Permit and discussed above, is based on a "preliminary testing" completed by Dr. Teh who "reported at 6 July 2010 IEP Contaminant Work Team meeting that *P. forbesi* reproduction and survival was negatively effected [sic] by ammonia concentrations as low as 0.36 mg N/L."[293] This statement also appeared in the

[289] Hearing Transcript, p. 197:14-17 ("... some of the staff think that the effluent limits that are in your tentative permit are the right limits for the wrong reason.").

[290] Permit, p. F-57.

[291] Hearing Transcript, pp. 406:8-407:20.

[292] The District lodged various other objections at the hearing, and all were overruled. The District takes exception to all such rulings. At the present time, it does not appear that other matters objected to became a specific basis for Permit terms or findings. However, to the extent it may become relevant, the District may wish to provide further argument in regard to such objections.

[293] Permit, p. J-2.

September Tentative Permit and the District provided comment and evidence regarding this statement.[294]

The September Tentative Permit also contained the statement that "Dr. Teh plans additional experiments to confirm the *P. forbesi* findings and to attempt to establish NOECs and LOECs."[295] This text was, however, dramatically modified in the November Tentative Permit and Permit as adopted. In particular, the reference to planned future studies was changed to say that Dr. Teh "completed" additional experiments and "confirmed" his findings that were purportedly reported in July, and goes on, in three additional sentences, to describe what Dr. Teh concluded.[296] The sole authority cited is "November 10, 2010 letter from Dr. Swee Teh, University of California, Davis to Dr. Chris Foe, CVRWQCB."[297] The November Teh Letter states that its purpose is to report results on additional studies and describes various results.[298] The November Teh Letter also states that Dr. Teh will prepare a draft final report and subsequent report.[299]

Government Code section 11513(d) provides: "Hearsay evidence may be used for the purpose of supplementing or explaining other evidence but over timely objection shall not be sufficient in itself to support a finding unless it would be admissible over objection in civil actions." The November Teh Letter is cited as the sole basis for what "additional experiments"

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[294] September Tentative Permit, p. K-3; see, e.g., District's October 2010 Comments and Evidence Letter, p. 38.

[295] September Tentative Permit, p. K-3.

[296] See November Redline Tentative Permit, p. J-3. The full text as revised, and the text which should be stricken based on the District's objection, is as follows:

> Dr. Teh completed additional experiments and confirmed the *P. forbesi* findings. Dr. Teh concluded *P. forbesi* is more sensitive to total ammonia nitrogen at lower pH and the ionized fraction is more toxic than unionized fraction of ammonia to *P. forbesi*. The Low Observed Effect Concentration (LOEC) of 0.36 mg/L from chronic 31-day study indicated total ammonia at environmentally relevant concentrations of 0.3 to 0.6 mg/L as seen in the Cache Slough regions may pose significant effect on the survival and population of *P. forbesi*. Reproduction performance, i.e., time for female to be gravid and surviving of newborn to the juvenile stages, of *P. forbesi* is affected by ammonia at concentration ≥ 0.36 mg/L. (November Redline Tentative Permit, p. J-3; Permit, p. J-3.)

[297] November Redline Tentative Permit, p. J-3; Permit, p. J-3; November Teh Letter.

[298] November Teh Letter, p. 1.

[299] November Teh Letter, p. 4.

purportedly show, and the Permit relates the content of the letter as findings.[300] This is classic hearsay and improper. The Regional Board should not have considered this evidence in adopting the Permit.

Hearsay evidence is "evidence of a statement that was made other than by a witness while testifying at the hearing and that is offered to prove the truth of the matter stated."[301]

At the hearing, the District objected to the November Teh Letter on the grounds of basic fairness of process, and because the letter is hearsay.[302] The District also objected to "the text of the appendix that simply recites what the letter says as being fact."[303] The District pointed out that the letter was cited for specific Permit findings.[304] Inefficient discussion then proceeded on the subject of whether the November Teh Letter was merely corroborative of non-hearsay (or, in the language of the statute, whether it supplements or explains other evidence). The letter is *not* corroborative of non-hearsay. Staff asserted that the letter confirmed the July information, but the issue properly is what the "additional experiments" described in the November letter themselves amount to.[305] Staff also stated that he had "looked at the test methods," which is not the question, and had "reviewed the actual data."[306] Whatever data this may be, and assuming representations were somehow being made about what the data show, this too is hearsay. There was no non-hearsay evidence as to the content of the findings of the recent work. For that matter, the July information is hearsay as well. Beyond that, it remains true that parties were deprived of any realistic opportunity to address the information in the November Teh Letter.

Accordingly, the State Board should strike the November Teh Letter, Finding 6 on page F-56 of the Permit, and the first four full sentences on page J-3 of the Permit.

The District believes it important to emphasize certain points. First, the issue addressed

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[300] Permit, p. F-56.

[301] Evid. Code, § 1200(a).

[302] Hearing Transcript, pp. 406:8-407:5, 407:16-18.

[303] Hearing Transcript, p. 407:18-20.

[304] Hearing Transcript, p. 409:2-7.

[305] See Hearing Transcript, pp. 409:2-411:1.

[306] Hearing Transcript, p. 411:4-6.

above is by no means the only deficiency in the Permit's Appendix J, and its findings in the Fact Sheet based on information in Appendix J. Second, the District does not consider the improper evidence to be a smoking gun or simply seek to bury evidence that is somehow "problematic." The District has addressed the relevant technical issues above. However, the evidence is simply improper and symptomatic of a rush to judgment based on preliminary work that is entirely inappropriate.

c. Findings Regarding Inhibition of Diatom Primary Production Are Not Supported by the Evidence in the Record

In addition to using Dr. Teh's preliminary results to find acute and/or chronic toxicity, the Regional Board also discusses information with respect to inhibition of diatom primary production caused, in part, by ammonia inhibition to find that ammonia may be affecting aquatic life beneficial uses.[307] The Regional Board used this information as a reason to deny acute and/or chronic mixing zones and to support the adopted final effluents for ammonia.[308] However, the Permit findings with respect to ammonia inhibition of nitrate uptake are not supported by evidence in the record; not proper interpretations of applicable water quality objectives; unrelated to acute and/or chronic mixing zones; and unrelated to the final adopted effluent limitations.[309]

The Permit proposes that one of the hypotheses for the POD is low primary production rates or low chlorophyll levels in the Delta.[310] The Permit identifies three hypothesized factors that may be causing low primary production rates in Suisun Bay of which only one, ammonia inhibition of nitrate uptake by diatoms, could possibly be alleged to be connected to effluent discharges from the SRWTP.[311] The other two factors, depletion due to filtration by clams and high turbidity, are unrelated to SRWTP discharges.[312] In any case, the three factors are hypotheses, and the Permit and Permit record do not include convincing evidence to show that

[307] Permit, p. J-5.

[308] Permit, pp. F-55 to F-56.

[309] Permit, p. F-55, Findings 3-5.

[310] Permit, p. J-5.

[311] Permit, p. J-5.

[312] Permit, p. J-5.

ammonia inhibition is a factor affecting aquatic life beneficial uses, or that ammonia reduction in the SRWTP effluent to the levels required by the Permit would actually increase diatom biomass in Suisun Bay.[313]

For example, the Permit provides no direct evidence regarding how often the alleged impact occurs, for how long, why it is a problem, how it affects the food web, or whether it affects fish species—all information necessary to show how ammonia inhibition might impair aquatic life beneficial uses. Further, due to the overwhelming and well-documented impact of benthic grazing by the invasive clam *Corbula amurensis* on phytoplankton biomass during the summer and fall in Suisun Bay (Alpine & Cloern 1992, Jassby et al. 2002, Kimmerer 2005, Thompson 2000),[314] tremendous uncertainty exists as to whether the upper SFE would experience a return of historic summer-fall phytoplankton biomass in the brackish Delta if the estuary remains colonized by *Corbula*—regardless of other physical or chemical changes that may occur.[315]

Currently, the hypothesized potential for increased diatom biomass in Suisan Bay related to ammonia reduction is logically constrained to the April-May window when lower benthic grazing rates (claim grazing), increased water temperature, density stratification, and other factors occasionally provide windows for bloom development. However, historical evidence indicates that the spring period (April-May) was not when the bulk of annual phytoplankton biomass occurred in Suisun Bay.[316] Instead, prior to the arrival of the clam in 1987, June-September were

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[313] See District's October 2010 Comments and Evidence Letter, pp. 25-26; Engle Written Testimony, p. 4.

[314] Alpine, A.E., and J.E. Cloern. 1992. Trophic interactions and direct physical effects control phytoplankton biomass and production in an estuary. Limnol. Oceanogr. 37:946-955 (Alpine & Cloern 1992).

Jassby, A.D., J.E. Cloern, B.E. Cole. 2002. Annual primary production: patterns and mechanisms of change in a nutrientrich tidal estuary. Limnol Oceanogr 47:698-712 (Jassby et al. 2002).

Kimmerer, W.J. 2005. Long-term changes in apparent uptake of silica in the San Francisco estuary. Limnol Oceanogr 50:793-798 (Kimmerer 2005).

Thompson, J.K. 2000. Two stories of phytoplankton control by bivalves in San Francisco Bay: the importance of spatial and temporal distribution of bivalves. J Shellfish Res 19:612 (Thompson 2000).

[315] District's October 2010 Comments and Evidence Letter, p. 25; Engle Written Testimony, p. 4.

[316] SRCSD 2010.

the months of highest mean phytoplankton biomass in Suisun Bay and the confluence zone.[317] Thus, even if ammonium reductions led to more frequent spring blooms in Suisun Bay—grazing by *Corbula* during summer and fall months would still prevent a recovery of annual algal biomass to levels that occurred historically in Suisun Bay in the 1970s and early 1980s.

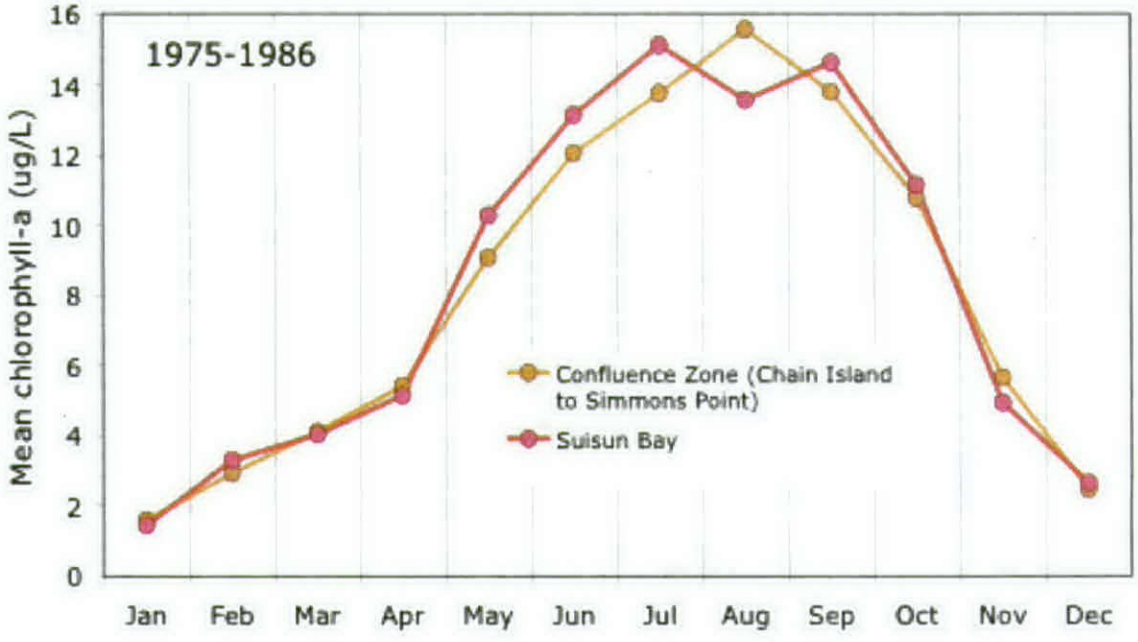

Figure 4. Mean monthly chlorophyll-a concentrations from surface (0-2 m) water samples collected between 1975-1986 at stations used by the IEP, DWR-MWQI, and the USGS. The bulk of annual phytoplankton biomass historically occurred during the same months (June-October) during which *C. amurensis* currently controls phytoplankton biomass in the brackish estuary. Figure is from SRCSD 2010.[318]

Further, the Permit overstates the evidence provided by field surveys in Suisun Bay. The Permit relies on Wilkerson et al. 2006[319] and Dugdale et al. 2007[320] to state that "[a]mmonia-induced inhibition of nitrate uptake prevents spring algal blooms from developing when conditions are otherwise favorable."[321] However, no time series data are presented in either

[317] See Figure 4.

[318] SRCSD 2010.

[319] Wilkerson, F.P., R.C. Dugdale, V. Hogue, and A. Marchi. 2006. Phytoplankton blooms and nitrogen productivity in San Francisco Bay. Estuaries and Coasts 29(3):401-416 (Wilkerson et al. 2006).

[320] Dugdale, R.C., F.P. Wilkerson, V.E. Hogue, and A. Marchi. 2007. The role of ammonium and nitrate in spring bloom development in San Francisco Bay. Est. Coast. Shelf. Sci. 73:17-29 (Dugdale et al. 2007).

[321] Permit, p. J-5.

publication regarding several environmental parameters (e.g., stratification, benthic grazing by clams, zooplankton abundance, residence time, Delta outflow), which are important to the determination of whether conditions are "favorable" for blooms.[322] In the time series presented in Wilkerson et al. 2006 and Dugdale et al. 2007, algal blooms occurred in Suisun Bay only twice out of five periods when ammonium concentrations fell below 4 μM,[323] and one of the blooms (Spring 2003) failed to yield chlorophyll-a levels above 10 μg/L—a level commonly referenced as a threshold for nutritional adequacy for Delta zooplankton.

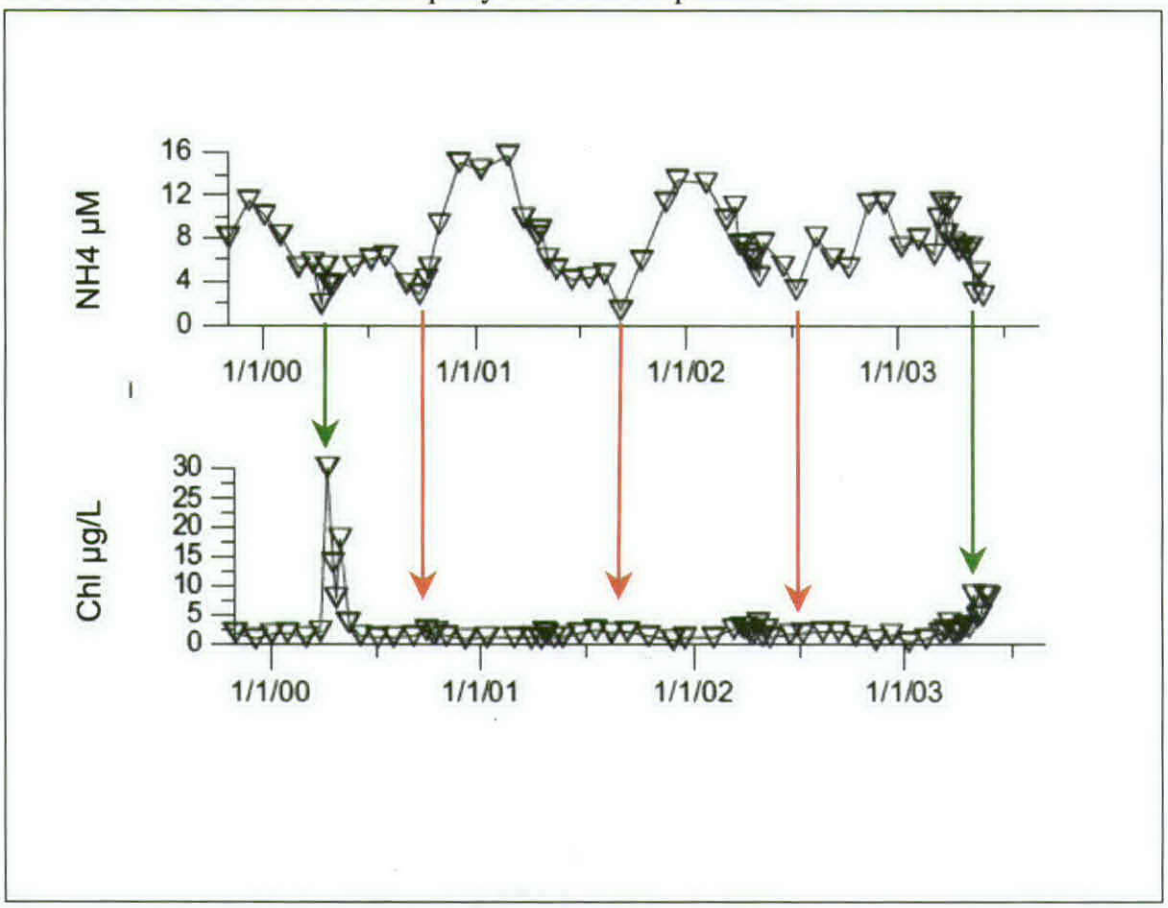

Figure 5. Time series of ammonium and chlorophyll-a from Suisun Bay. Green arrows indicate where ammonium concentrations below a 4 μM threshold were accompanied by increases in chlorophyll-a. Red arrows show periods when similarly low ammonium concentrations were not accompanied by increases in chlorophyll-a. Panels are from Figure 1 in Dugdale et al. 2007; identical time series presented in Wilkerson et al. 2006. Figure is from SRCSD 2010.[324]

[322] District's October 2010 Comments and Evidence Letter, p. 26; Engle Written Testimony, p. 4.

[323] See Figure 5.

[324] SRCSD 2010.

This pattern amply illustrates that other factors frequently prevent blooms in Suisun Bay, even when ammonium concentrations are below the "Dugdale threshold" of 4 μM.[325] In fact, with the documentation of drawdown of ammonium during the onset of blooms by Wilkerson et al. 2006,[326] time series limited to measurements of ammonium and chlorophyll-a cannot rule out the possibility that low ammonium concentrations *in situ* are the *result* of a bloom triggered by non-nutrient factors, rather than the *cause*.

The same methodological shortcomings apply to the recent fieldwork funded by the San Francisco Regional Board, in which ammonia and chlorophyll-a were purportedly measured about twice per month during the spring/summer of 2010.[327] The Permit mentions the project, but no related documentation is publicly available.[328] The interpretation of field data for ammonia and chlorophyll-a collected on such a coarse time scale fails to rule out the possibility that other environmental factors initiate blooms in Suisun Bay—and that low ammonium concentrations are a result of the blooms (not a requirement for them).

The Permit references a number of different studies respecting theories that ammonium inhibition and shifts in algal communities caused by ammonia are causes of the POD and necessitate the Permit limits resulting in full nitrification of the effluent.[329] However, as shown below, reliance on the studies identified is misplaced and there exists significant evidence that contradicts the theories espoused in the Permit.

i. The Evidence in the Record Fails to Support Findings That Ammonia Is Responsible for Decreases in Chlorophyll-a and Changes the Phytoplankton Composition Downstream From the SRWTP

Many predictions based on the ammonium-inhibition theory (and other ammonia/algae hypotheses) have been contradicted by results from recent studies funded by DWR, CalFed,

[325] District's October 2010 Comments and Evidence Letter, p. 26; Engle Written Testimony, p. 4.

[326] Wilkerson et al. 2006.

[327] Permit, p. J-5; District's October 2010 Comments and Evidence Letter, p. 26; Engle Written Testimony, p. 4.

[328] Permit, p. J-5.

[329] Permit, pp. J-1, J-5 to J-8.

Regional Board, and State Water Contractors. Unsubstantiated predictions include: (1) chlorophyll-a production would be lower and slower in river water below the discharge compared to above the discharge; (2) the SRWTP discharge would trigger a change in the relative biomass of large (e.g., diatoms) versus small phytoplankton in the Sacramento River; (3) biomass of phytoplankton would not increase in the river in reaches where ammonium uptake exceeded nitrate uptake; and (4) ammonia concentrations would explain the occurrence of *Microcystis*, a nuisance species. In addition, the Permit does not place ammonia-related hypotheses in context with other well-regarded hypotheses for recent changes in the biomass or composition of phytoplankton in the upper estuary.[330]

(a) Ammonia Concentrations Above the Threshold of 4 μM Have Been Shown to Stimulate Growth of N-Limited Phytoplankton as They Enter the Delta in the Sacramento River

Five-day "grow-out" experiments were conducted by Parker et al. 2010[331] using water collected above and below the SRWTP discharge in November 2008 and March and May 2009. The grow-out experiments were intended to eliminate light limitation, but by design also eliminate other environmental factors (e.g., settling and *in situ* grazing) that potentially affect riverine phytoplankton biomass in transport through the Delta.[332] During three out of four of the grow-out experiments, phytoplankton grew *better* in water collected at River Mile 44 below the SRWTP discharge than they did in Sacramento River water collected above the discharge, even though the ammonium concentrations at River Mile 44 were well above the Dugdale threshold of 4 μM.[333]

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[330] See Permit, pp. J-1 to J-8.

[331] Parker, A.E., A.M. Marchi, J. Davidson-Drexel, R.C. Dugdale, and F.P. Wilkerson. 2010. Effect of ammonium and wastewater effluent on riverine phytoplankton in the Sacramento River, CA. Final Report. Technical Report for the California State Water Resources Board, May 29, 2010 (Parker et al. 2010).

[332] District's October 2010 Comments and Evidence Letter, p. 27; Engle Written Testimony, p. 4.

[333] Ammonium concentrations in RM-44 water used in the grow-out experiments were: July 2008 - 9.06 μM; November 2008 - 71.87 μM; March 2009 - 12.47 μM; May 2009 - 9.54 μM (Table 19-22 in Parker et al. 2010); see Figure 6.

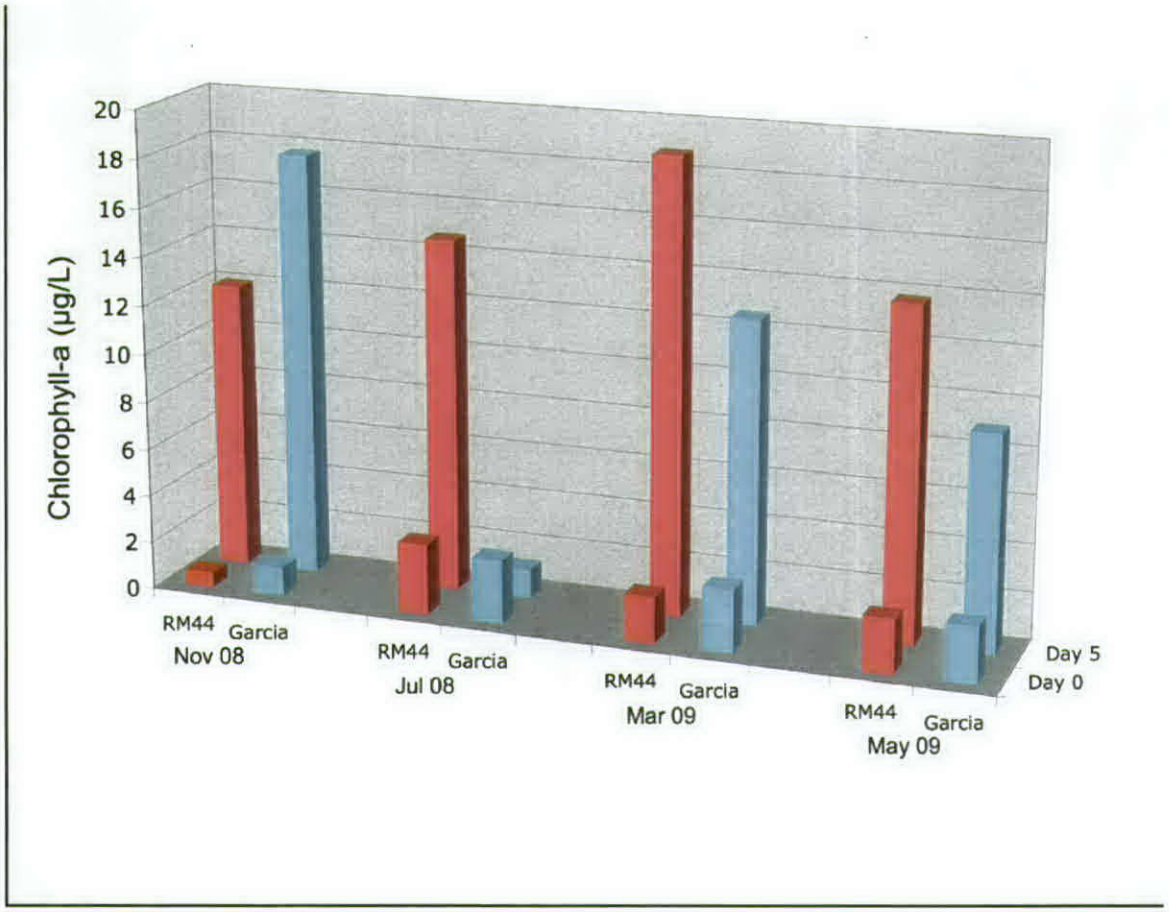

Figure 6. Results of 5-day grow-out experiments using water collected below the SRWTP discharge (RM-44, red bars) and above the SRWTP discharge (Garcia Bend, blue bars). In three out of four experiments (July 2008, March 2009, May 2009), phytoplankton biomass (chlorophyll-a) was higher after five days in water collected below the SRWTP discharge than in water collected above the discharge. Initial ammonium concentrations in RM-44 water used in the grow-out experiments were: July 2008 - 9.06 μM; November 2008 - 71.87 μM; March 2009 - 12.47 μM; May 2009 - 9.54 μM. Data are from Tables 19-21 in Parker et al. 2010.[334]

These results of the grow-out experiments led Parker et al. 2010 to paint a picture of *nitrogen-limited phytoplankton* upstream from the SRWTP, which potentially benefit from the ammonia introduced at the discharge.[335] Based on these results, little evidence exists to attribute downstream decreases in chlorophyll-a observed in some field surveys in the Sacramento River to

[334] Parker et al. 2010.

[335] See Parker et al. 2010, p. 26 ("Results from experimental grow-outs suggest that after removing light limitation phytoplankton bloom magnitude in the Sacramento River at RM-44 (downstream of SRWTP discharge) and GRC (upstream of SRWTP discharge) is likely determined by dissolved inorganic nitrogen (DIN) availability. Grow-out experiments conducted at RM-44 produced more chlorophyll-a than experimental grow-outs conducted at GRC. Phytoplankton appeared to take advantage of additional DIN, whether supplied as NO3 or NH4 in experiments conducted with water from GRC, or in the form of NH4 supplied in the wastewater effluent (at RM-44) to produce greater biomass.").

ammonium inhibition and suggest that it is more appropriate to consider loss factors (e.g., settling) that were nullified by the grow-out tests, but which operate *in situ*.[336]

(b) Longitudinal Studies of the Sacramento River Contradict Hypotheses That the SRWTP Discharge Causes a Decrease in Phytoplankton Biomass or Primary Production Rates, or That it Changes the Cell Size or Taxonomic Composition of Phytoplankton

Additionally, the Permit finds mixing zones should be denied based on far field impacts to aquatic life beneficial uses associated with hypothesized shifts in algal communities.[337] However, substantial evidence and information exists to suggest otherwise.[338] Specifically, multiple longitudinal transects, measuring nutrients and algal biomass in the Sacramento River from above Sacramento (I-80 bridge) to Suisun Bay, were conducted by Regional Board staff in 2008-2010.[339] Both studies revealed that although chlorophyll-a often declines in the downstream direction from the I-80 bridge above Sacramento to Rio Vista, no step decline is associated with the SRWTP discharge.[340] For example, in the data shown in Figure 7, more phytoplankton biomass (green line) was lost from river water *above* the SWRTP discharge than below. Further, most of the decline in diatoms (blue bars) occurred *upstream* of the SRWTP—a field result which directly contradicts the ammonium-inhibition hypothesis for the lower Sacramento River portion of the freshwater Delta.

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[336] District's October 2010 Comments and Evidence Letter, pp. 27-28; Engle Written Testimony, p. 4.

[337] Permit, pp. F-56, J-7.

[338] District's October 2010 Comments and Evidence Letter, pp. 28-29; Engle Written Testimony, p. 4.

[339] Foe et al. 2010, and Parker et al. 2009 and 2010.

[340] District's October 2010 Comments and Evidence Letter, p. 29; Engle Written Testimony, p. 4.

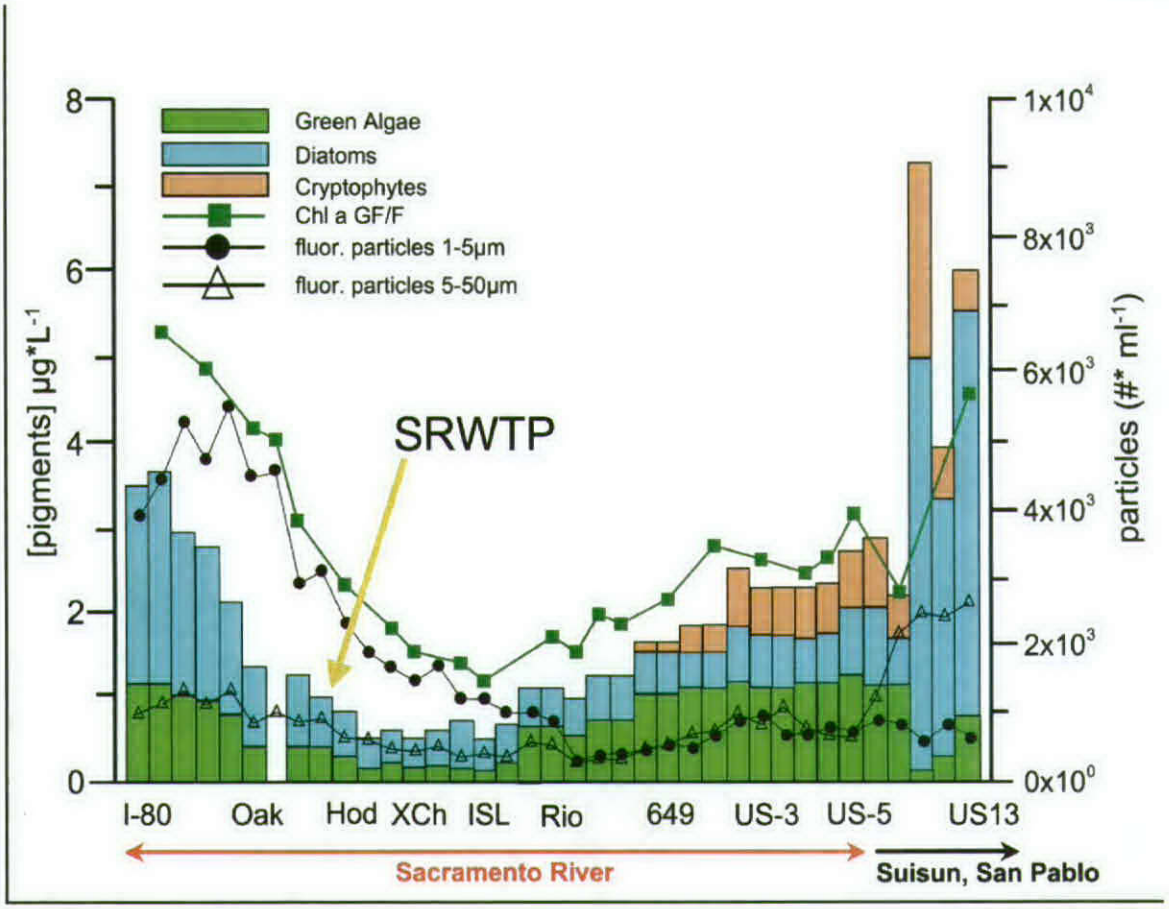

Figure 7. Longitudinal patterns in chlorophyll-a (green squares), biomass of major phytoplankton taxa (colored bars), concentration of small phytoplankton (black circles), and concentration of large phytoplankton (open triangles). Figure is from Engle 2010a.[341]

Analogous data from Parker et al. 2010 also contradict elements of the ammonium inhibition hypothesis and confirm that the location of the SRWTP discharge cannot explain patterns in phytoplankton biomass, cell size, or taxonomic composition in the Sacramento River. Figure 8 reveals that a downstream decrease in large phytoplankton (assumed by the investigators to be diatoms)—when it occurs—does not begin (nor does it accelerate) below the SRWTP discharge. Further, small phytoplankton do not increase in relative abundance below the SRWTP discharge. In other words, ammonium inputs at the SRWTP discharge do not control the relative abundance of large phytoplankton (presumed to be diatoms) and small phytoplankton. Thus, contrary to the Permit's findings, these field data directly contradict the hypothesis that ammonia will cause small phytoplankton to out-compete large (diatom) phytoplankton.[342]

[341] Parker et al. 2010 and Engle 2010a.

[342] See District's October 2010 Comments and Evidence Letter, pp. 28-29; Engle Written Testimony, p. 4.

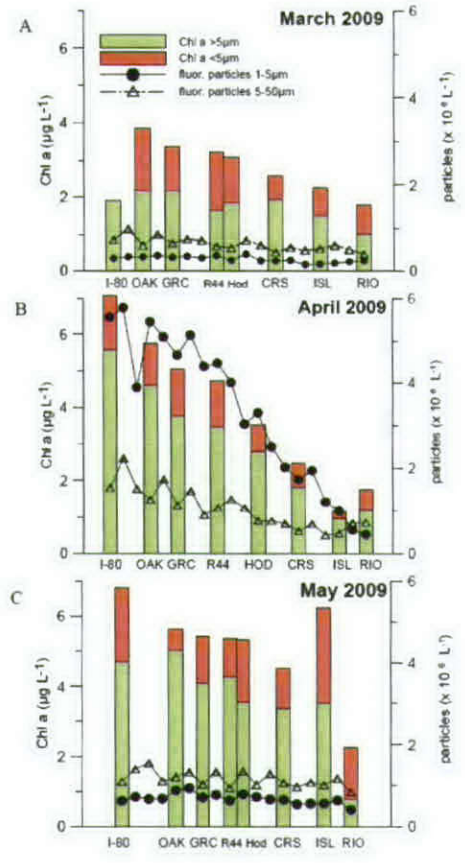

Figure 8. Longitudinal patterns in biomass of large phytoplankton (green bars and open triangles) and small phytoplankton (red bars and closed circles) in the Sacramento River between the I-80 Bridge and Rio Vista during Spring 2009. Large phytoplankton are presumed by the investigators to include most of the diatoms. Bars indicate biomass as chlorophyll-a. Lines indicate cell density measured by fluorescence. Data show that the SRWTP discharge (located between station GRC and R44) does not explain the overall patterns in algal biomass or cell size in the river. Figure is from Parker et al. 2010.[343]

Short-term rate measurements made in the same study also contradict elements of the ammonium inhibition hypothesis. Rate measurements in Figure 9 show that primary production rates (black triangles) do not consistently decline in the downstream direction in the Sacramento River, and when they do, the decline is not initiated or intensified after water flows past the SRWTP discharge. The field data also show that ammonium uptake rates (orange symbols) are *not* inversely related to primary production rates.[344] Again, these field data directly contradict the

[343] Parker et al. 2010.

[344] Parker et al. 2010; District's October 2010 Comments and Evidence Letter, pp. 28-29; Engle Written Testimony, p. 4.

hypothesis that ammonium uptake causes a decrease in primary production in the river. These field data demonstrate that predictions about phytoplankton growth responses and ammonium uptake based on multiple-day, small container experiments in Wilkerson et al. 2006 and Dugdale et al. 2007 should not be presumed valid outside the laboratory, and cannot be considered evidence of impacts to aquatic life beneficial uses from SRWTP discharges.

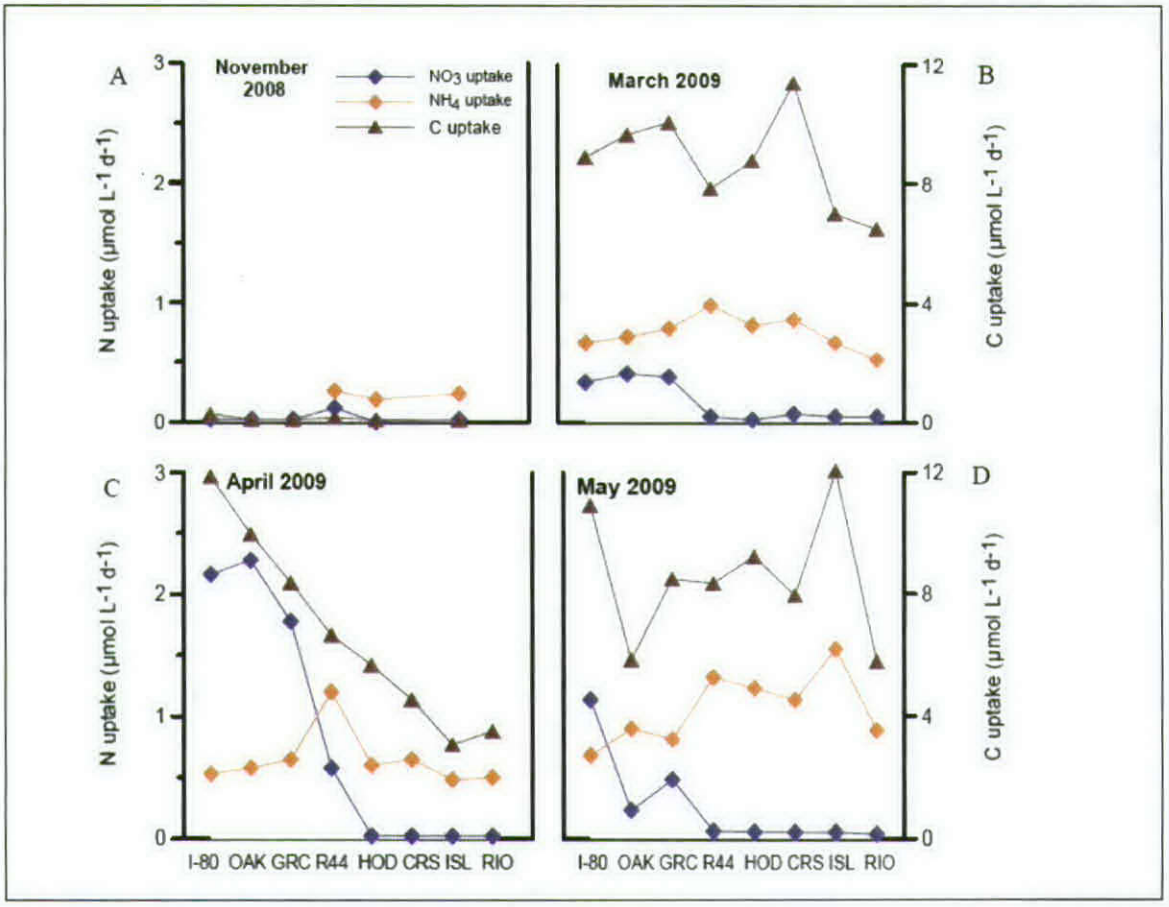

Figure 9. Primary production (C uptake; triangles) and phytoplankton uptake rates of ammonium (orange symbols) and nitrate (blue symbols) made during 24-hr incubations of Sacramento River water collected during four transects between I-80 bridge and Rio Vista. Data do not reveal an inverse relationship between primary production and ammonium uptake. Data further show that longitudinal patterns in primary production are not explained by the SRWTP discharge (located between GRC and R44). Figure is from Parker et al. 2010.[345]

Further, the Permit acknowledges that factors unrelated to the SRWTP discharge explain declines in chlorophyll-a (and other indices of phytoplankton biomass), which were observed between the Yolo/Sacramento County line and the Rio Vista locale during the 2008-2009 field

[345] Parker et al. 2010.

studies.[346] Contrary to all of the evidence presented above, the Permit relies on unpublished work from an *oral presentation* at the September 2010 Bay-Delta Science Conference[347] to suggest otherwise. Specifically, the Permit quotes a conference abstract to find that ammonium uptake by phytoplankton controls primary production rates in the Sacramento River.[348]

The Permit's reliance on the conference abstract to make such a finding is misplaced. For example, the data displayed above in Figure 9 (which are contained in a report to the Regional Board) directly contradict the assertion that there is an inverse relationship between ammonium uptake and primary production. Further, representative data from the same longitudinal study referred to in the Permit[349] (see Figure 10 below), which were previously presented in a poster at a 2009 conference,[350] described in Engle 2010a,[351] (and presented in oral testimony by the water contractors at the December 9, 2010, Regional Board hearing),[352] also contradict the assertion of an inverse relationship between ammonium uptake and primary production.[353] The longitudinal transects by the Parker/Dugdale team during this 2008-2009 Sacramento River project included rate measurements (uptake of carbon, ammonia, and nitrate) at 21 stations starting from I-80 bridge above Sacramento downstream through Suisun Bay and into San Pablo Bay. These rate measurements show that primary production rates (carbon uptake, indicated by black line in

[346] See Permit, pp. J-6 to J-7 ("The decrease in chlorophyll[a] appears to commence above the SRWTP. The average annual decline in pigment between Tower Bridge in the City of Sacramento and Isleton is about 60 percent. The cause of the decline is not known, but has been variously attributed to algal settling, toxicity from an unknown chemical in the SRWTP effluent, or from ammonia. The SRWTP discharge cannot be [the] cause of pigment decline upstream of the discharge point, and may not be contributing to the decline downstream of the discharge point."); see also District's October 2010 Comments and Evidence Letter, p. 28.

[347] Parker, A., D. Dugdale, F. Wilkerson, and A. Marchi. 2010. Biogeochemical processing of anthropogenic ammonium in the Sacramento River and the Northern San Francisco Estuary. 6th Biennial Bay-Delta Science Conference, September 27-29, 2010. Sacramento, CA.

[348] Permit, p. J-6 ("Evidence for ammonia impairment of algal primary production in the Delta was reported for the first time at the 6th Biennial Bay-Delta Science Conference by Dr. Parker. Dr. Parker stated that a U-shaped pattern of primary production and chlorophyll was observed . . . with a maximum in the river above the SRWTP and again to the west in San Pablo Bay, essentially a mirror image of the distribution of ammonia concentrations." [internal footnote and italics omitted]).

[349] See fn. 178, *supra*.

[350] Parker et al. 2009.

[351] Engle 2010a.

[352] Hearing Transcript, p. 293:11-13.

[353] District's October 2010 Comments and Evidence Letter, pp. 28-29; Engle Written Testimony, p. 4.

Figure 10) can decline in the Sacramento River between the I-80 bridge and the confluence zone—*regardless of whether phytoplankton were principally taking up ammonia (shown by the red bars) or nitrate (shown by the blue bars)* at sampling locations. In other words, primary production rates can decrease *starting upstream* of the SRWTP, *despite the fact that nitrate dominated N uptake in that reach of the river*. Also, significant *increases* in carbon fixation began in the confluence zone (stations 649 through US3), despite the fact that inorganic nitrogen uptake was dominated by ammonium in that reach.[354] Collectively, these results imply that other factors (probably hydrodynamic factors such as stratification, current speed, residence time) are controlling phytoplankton biomass and primary production in the Sacramento River—not ammonium inhibition.

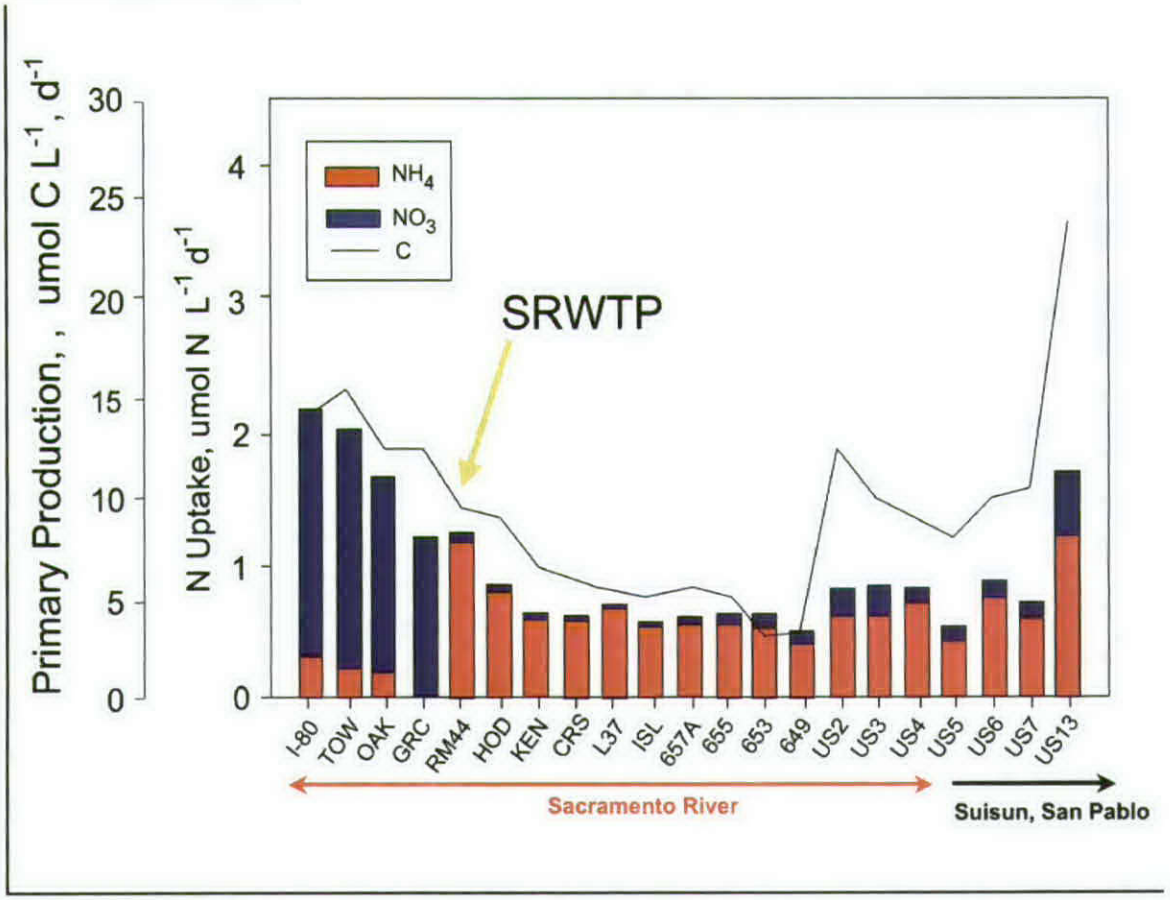

Figure 10. Longitudinal patterns in primary production (black line) and rates of ammonium uptake (red bars) and nitrate uptake (blue bars) in the Sacramento River. Data indicate that the location of the SRWTP (and a switch from nitrate to ammonium uptake) does not initiate the decline in primary production in the river, nor does ammonium uptake prevent increases in primary production in the confluence zone (stations 649 through US3). Figure is from Engle 2010a.

[354] See Figure 10.

(c) Evidence From Studies Conducted in the Delta Contradicts the Hypothesis That Ammonia (or Nutrient Ratios Involving Ammonia) Promote Blooms of *Microcystis* (Blue-Green Algae)

Attachment J to the Permit implies that *Microcystis* blooms "may" be associated with ammonia from the SRWTP.[355] *Microcystis* are considered to be less nutritious to primary consumers like zooplankton as compared to diatoms.[356] However, available research from the Delta—which is ignored in the Permit—argues against a simplistic association between *Microcystis* and nutrient form or concentration.[357] Delta studies conducted by Lehman et al. 2008 and 2010[358] and Mioni 2010[359] have found no apparent association between ammonium concentrations or NH_4^+:P ratios and either *Microcystis* abundance or toxicity. Instead, it appears from these studies that water temperature is strongly positively correlated with *Microcystis* abundance and toxicity, and that water transparency, flows, and specific conductivity are also potential drivers of *Microcystis* blooms in the Delta.[360] An association between water temperature and *Microcystis* blooms in the Delta is supported by the upward trend in spring-summer mean water temperature in the freshwater Delta between 1996 and 2005[361] and would be consistent with observations from other estuaries, where increased residence time (e.g., during drought) and

[355] Permit, p. J-1.

[356] Permit, p. J-8.

[357] District's October 2010 Comments and Evidence Letter, pp. 29-30; Engle Written Testimony, p. 4.

[358] Lehman, P.W., G. Boyer, M. Satchwell, and S. Waller. 2008. The influence of environmental conditions on the seasonal variation of *Microcystis* cell density and microcystins concentration in the San Francisco Estuary. Hydrobiologia 600:187-204 (Lehman et al. 2008).

Lehman, P.W., S.J. Teh, G.L Boyer, M.L. Nobriga, E. Bass, and C. Hogle. 2010. Initial impacts of *Microcystis aeruginosa* blooms on the aquatic food web in the San Francisco Estuary. Hydrobiologia 637:229-248 (Lehman et al. 2010).

[359] Mioni, C.E., and A. Paytan. 2010. *What controls Microcystis bloom & toxicity in the San Francisco Estuary? (Summer/Fall 2008 & 2009).* Delta Science Program Brownbag Series, Sacramento, CA. May 12, 2010 (Mioni 2010).

[360] District's October 2010 Comments and Evidence Letter, p. 29; Engle Written Testimony, p. 4.

[361] Jassby, A. 2008. Phytoplankton in the Upper San Francisco Estuary: recent biomass trends, their causes and their trophic significance. San Francisco Estuary & Watershed Science, Feb. 2008 (Jassby 2008).

warmer temperatures are acknowledged as factors stimulating cyanobacterial (i.e., *Microcystis*) blooms.[362]

(d) The Permit Does Not Link Trends in Nutrient Ratios to Changes in Delta Phytoplankton Composition

The Permit recites hypotheses that exist with respect to nutrient ratios and phytoplankton composition.[363] Significantly, it does not make findings that such hypotheses are valid, as discussed below. However, because the hypotheses are mentioned in the Ammonia Issues Appendix, the District addresses this issue below. The Permit apparently refers to two sources: (1) an opinion presumably held by R. Dugdale,[364] and (2) a statistical analysis by P. Glibert 2010[365].[366] Dugdale's opinion, which is not articulated in any of his publications, is not directly supported by any publicly available experimental work conducted to date by his research group at San Francisco State University (SFSU).[367] Taxonomic changes in Delta phytoplankton (i.e., cell counts or other direct evidence of species composition) have not been reported for experimental manipulations of the NH4:NO3 ratio (i.e., grow-out experiments) by the Dugdale laboratory, nor has the work of Dugdale and his colleagues included experimental manipulations of N:P ratios. Similarly, although the Permit refers to a hypothesis advanced in Glibert 2010 (that nutrient ratios

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[362] Pearl, H.W., K.L. Rossignol, S. Nathan Hall, B.L. Peierls, and M.S. Wetz. 2009. Phytoplankton community indicators of short- and long-term ecological change in the anthropogenically and climatically impacted Neuse River Estuary, North Carolina, USA. Estuaries and Coasts. DOI 10.1007/s12237-009-9137-0 (Pearl et al. 2009).

Pearl, H.W., and J. Huisman. 2008. Blooms like it hot. Science 320:57-58. doi:10.1126/science.1155398 (Pearl & Huisman 2008).

Fernald, S.H., N.F. Caraco, and J.J. Cole. 2007. Changes in cyanobacterial dominance following the invasion of the zebra mussel *Dreissena polymorpha*: long-term results from the Hudson River Estuary. Estuaries and Coasts 30:163-170 (Fernald et al. 2007).

[363] Permit, pp. J-7 to J-8.

[364] The opinion in the Permit is attributed to "Dugdale et al." in the text (Permit, p. J-8), but not clearly associated to a source in the footnote. (Permit, p. J-7.)

[365] Glibert, P.M. 2010. Long-Term Changes in Nutrient Loading and Stoichiometry and Their Relationships with Changes in the Food Web and Dominant Pelagic Fish Species in the San Francisco Estuary, CA. Rev. Fish. Sci. 18:2, 211-232 (Glibert 2010).

[366] Permit, pp. J-7 to J-8.

[367] Taxonomic changes in Delta phytoplankton (i.e., cell counts or other direct evidence of species composition) have not been measured in experimental manipulations of the NH4:NO3 (i.e., grow-out experiments). The growth rates of different phytoplankton taxa have not been compared when presented with different N:P ratios in Delta water.

are responsible for the observed shift in the Delta phytoplankton community),[368] Glibert's conclusions were not based on direct experimental evidence of differential phytoplankton growth responses to nutrient ratios in the SFE.[369] Instead, Glibert arrived at her conclusions using an improperly applied statistical transformation (cumulative sums of variability, or CUSUM) to produce artificial and highly misleading correlations between nutrient parameters and biological parameters (phytoplankton, zooplankton, fish abundance).[370]

Glibert's approach is analytically and conceptually flawed, as detailed in Engle & Suverkropp (2010).[371] Further, the type of correlation analysis used in Glibert's article violates the underlying assumptions for linear regression and produces misleading results that are not supported by underlying data.[372] Other concerns include the limited geographic extent of the data; possible improper sub-sampling of CUSUM time series; nontransparent data reduction; and omissions of key analyses necessary to support a claim for a link between nutrient ratios and the food web or to support alternative hypotheses.[373] Examples of these defects are summarized below:

- Inadequate Geographic Coverage. Sweeping generalizations are made in Glibert's paper regarding the estuarine food web and the POD using data from only one station in the Freshwater Delta (Hood, IEP station C3) and two stations in Suisun Bay (IEP stations D8 and D7).

[368] Permit, pp. J-7 to J-8.

[369] District's October 2010 Comments and Evidence Letter, p. 32.

[370] District's October 2010 Comments and Evidence Letter, pp. 32-33; Engle Written Testimony, p. 4; Sacramento Regional Wastewater Treatment Plant, NPDES Permit Renewal [Written] Testimony/Comments of Claus Suverkropp of Larry Walker Associates Regarding Statistical Analysis of the Potential Roles of Ammonia and Nutrient Ratios in the Upper San Francisco Estuary (Suverkropp Written Testimony), pp. 1-2.

[371] Engle, D. and C. Suverkropp. 2010. Memorandum: Comments for Consideration by the State Water Resources Control Board Regarding the Scientific Article *Long-term Changes in Nutrient Loading and Stoichiometry and their Relationships with Changes in the Food Web and Dominant Pelagic Fish Species in the San Francisco Estuary, California* by Patricia Glibert. 17 pp. July 29, 2010 (Engle & Suverkropp 2010).

[372] Engle & Suverkropp 2010, pp. 3-10.

[373] District's October 2010 Comments and Evidence Letter, pp. 32-33; Engle Written Testimony, p. 4; Suverkropp Written Testimony, pp. 1-2.

- Violation of Statistical Assumptions. Glibert used a calculation termed *CUSUM* to transform long-term datasets for nutrient concentrations and abundances of selected aquatic organisms, and then performed linear regression using the unordered transformed data for selected pairs of variables. Time series of CUSUM values exhibit features and patterns that diverge in several important ways from those of the underlying measured data and make them inappropriate for standard linear regression. CUSUM series mute seasonal or other short-term variation in a time series (which is meaningful for short-lived organisms like phytoplankton and zooplankton), but exaggerate shifts that occur on long time scales (such as decades). In the statistical literature, CUSUM is primarily used to create charts (or ordered values) for single variables that allow the user to detect change points or determine whether deviations from control points are random or signal a trend. However, the characteristics of CUSUM that lend it to change-point analysis and quality control make it completely inappropriate to perform standard linear regression using paired CUSUM values removed from their respective temporal sequences.

Accordingly, the simple CUSUM correlations that represent the basis for Glibert's conclusions violate virtually every assumption of a standard correlation analysis. CUSUM series are inherently serially correlated, heteroscedastic, and non-normally distributed, and the residuals of CUSUM correlations are non-independent.[374] Further, not all of the datasets used by Glibert are appropriate for customary uses of CUSUM. Autoregressive time series such as flow data are not appropriate for CUSUM change-point analysis. CUSUM change point analysis also assumes that underlying data are homoscedastic and often assumes that data are normally distributed. Glibert did not test raw data for autocorrelation, normality, or equal variance prior to the CUSUM transformation. Another requirement of CUSUM analysis is that time series being compared must start and stop at the same point in

[374] See Engle & Suverkropp 2010 for more detail.

time. However, Glibert's correlations appear to be performed by pairing CUSUM series for which underlying data spanned different ranges of years.

- Artificial Relationships and Inflated R^2 Values. The CUSUM transformation results in a very limited range of serially correlated data structures, which (if linear regression is performed for pairs of CUSUM series) leads to "correlations" with impressively inflated R^2 values that are largely artificial and cannot be interpreted in the same way as standard parametric correlation or regression analysis. Equally important, statistically significant relationships that *are* present in underlying data can be disguised when CUSUM time series are compared instead of real world measurements.
- Biased selection of variables, including failure to relate trends in nutrient ratios to those of phytoplankton or copepods. Several obvious pairings of environmental variables were omitted from Glibert's portfolio of CUSUM correlations, including those that were needed for her to claim that nutrient ratios and phytoplankton taxa were statistically related. For example, CUSUM regressions between nutrient *ratios* (TN:TP, NO_3:NH_4, or DIN:DIP) and phytoplankton indices (chl.a or abundances of individual taxonomic groups) were omitted from her analysis. Also, CUSUM trends in nutrient ratios were not directly compared to those for copepod abundance. NO_3:NH_4 trends were not compared to *any* of the biological trends (phytoplankton, copepods, clams, or fish. They were compared only to trends in Delta outflow. As a consequence, even if one were to accept Glibert's flawed correlation approach, her publication still does not provide evidence that nutrient ratios and phytoplankton composition are statistically related.[375]

Conversely, many well-known alternative hypotheses for the observed changes in plankton composition and fish abundance in the SFE (and in estuaries, generally)—which would have been testable using her CUSUM methodology—were omitted from her analysis and discussion in her article.[376] Due to the peculiarity of the CUSUM transformation, it is likely that a

[375] Engle & Suverkropp 2010; Engle Written Testimony, p. 4; Suverkropp Written Testimony, pp. 1-2.

[376] District's October 2010 Comments and Evidence Letter, p. 33; Engle Written Testimony, p. 4.

wide variety of non-nutrient environmental factors (essentially any factors which have trended over time in the SFE in concert with changes in fish abundance such as clam abundance, turbidity, or water exports) could be shown as highly correlated with pelagic fish abundance using CUSUM correlations.[377] For example, Figure 11 shows that when subjected to the same analysis used in Glibert's paper, annual water exports perform as well as ammonia concentrations in explaining trends in the summertime abundance of delta smelt. Glibert's CUSUM correlations between fish abundance and ammonia are convenient for focusing attention on ammonia (as opposed to other potential drivers of the food web or POD).[378] However, the correlations ultimately signify little with respect to the relative importance of multiple environmental factors which have changed over recent decades in the SFE.

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[377] District's October 2010 Comments and Evidence Letter, p. 33; Engle Written Testimony, p. 4; Suverkropp Written Testimony, pp. 1-2.

[378] District's October 2010 Comments and Evidence Letter, p. 33; Engle Written Testimony, p. 4; Suverkropp Written Testimony, pp. 1-2.

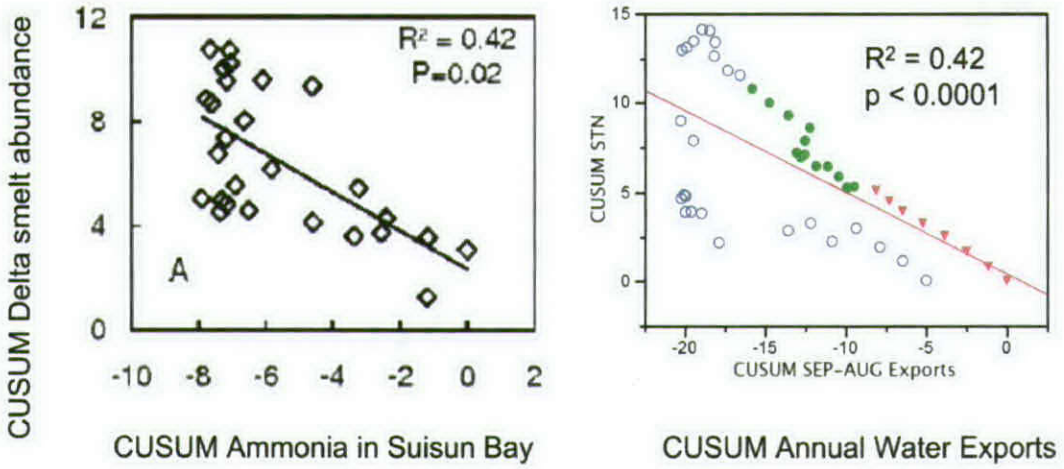

Figure 11. Comparison of correlations using CUSUM ammonia (Suisun Bay) or CUSUM annual Delta water exports (SWP, CVP, and Contra Costa Canal combined) as the independent variables (x-axis) and CUSUM values for the delta smelt Summer Townet Index as the dependent variable (y-axis). Correlation using ammonia is from Glibert 2010 and used data for 1975-2005. Correlation using annual water exports is from Engle & Suverkropp 2010. Color coding for subsets of the CUSUM series is as follows: open blue circles for pre-*Corbula* years (1956-1986), solid green circles for post-*Corbula* years 1987-1999, and red triangles for POD years 2000-2007. Details regarding underlying analyses are in Engle & Suverkropp 2010. The correlation coefficient (R^2 value) is the same for both regressions (0.42); both regression lines are significant. Figure is a combination of Figures 3 and 4 from Engle & Kuverkropp 2010.

Ultimately, the Permit recognizes the limitations associated with these theories that attempt to link nutrient ratios to changes in the Delta phytoplankton composition.[379] The Permit also acknowledges that additional studies are necessary to determine if nutrient control would have hypothesized effects on phytoplankton community structure.[380] Yet, despite these caveats, the Permit fundamentally relies on inappropriate and unsupported hypotheses to theorize (and

[379] Permit, p. J-8 ("Whether this [shift in algal communities] is the result of changes in nutrient concentrations and/or ratio is not known.").

[380] Permit, p. J-8 ("Follow up studies are needed to determine the ecological effect of the change in nutrient concentrations and ratios on the phytoplankton community and whether nutrient control might cause the community to revert back to a diatom-based system.").

allege) that discharges from the SRWTP are a cause of the POD and therefore full nitrification is justified. Clearly, the evidence in the record and the uncertainty identified in the Permit itself suggest otherwise.

(e) The Permit Ignores Alternative Hypotheses That Would Explain Observed Changes in Phytoplankton Composition in the Delta, Including the Occurrence of *Microcystis* Blooms

Although readily available and part of the Permit record, in adopting the Permit, the Regional Board ignored other information that suggests *physical factors* (e.g., temperature, current speed, residence time, turbulent mixing, stratification, light penetration) may be strongly affecting competitive outcomes between diatoms and other phytoplankton taxa in the Delta.[381] In particular, the influence of flows and residence time on phytoplankton assemblages in estuaries is well-acknowledged in other regions.[382] For example, hydrologic perturbations (e.g., droughts, floods, and storm-related deep mixing events) overwhelm nutrient controls on phytoplankton composition in the Chesapeake Bay; diatoms are favored during years of high discharge and short residence time.[383] The expert panel convened by CalFed in March 2009 summarized the impact of flow and residence time on estuarine microfloral composition in their final "*Ammonia Framework*" document, stating:

> [d]iatoms have fast growth rates and may be particularly good competitors during high flows with concomitant short residence times, when their fast growth rates can offset high flushing rates. In moderate flows, chlorophytes and cryptophytes become more competitive, whereas low flows with concomitant longer residence times allow the slower-growing cyanobacteria, non-nuisance picoplankton, and dinoflagellates to contribute larger percentages of the community biomass. These spatially and temporally-variable patterns of phytoplankton composition are typical of many estuaries [e.g., Chesapeake Bay, Maryland; Neuse-Pamlico Sound, North Carolina; Narragansett Bay, Rhode Island; Delaware Bay, Delaware]. (Meyer et al. 2009, p. 5.)[384]

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[381] District's October 2010 Comments and Evidence Letter, pp. 30-31; Engle Written Testimony, p. 4.

[382] District's October 2010 Comments and Evidence Letter, p. 30; Engle Written Testimony, p. 4.

[383] Pearl, H.W., L.M. Valdes, B.L. Peierls, J.E. Adolf, and L.W. Harding, Jr. 2006. Anthropogenic and climatic influences on the eutrophication of large estuarine ecosystems. Limnol. Oceanogr. 51:448-462 (Pearl et al. 2006).

[384] Meyer, J.S., P.J. Mulholland, H.W. Paerl, and A.K. Ward. 2009. A framework for research addressing the role of ammonia/ammonium in the Sacramento-San Joaquin Delta and the San Francisco Bay Estuary Ecosystem. Final report submitted to CalFed Science Program, Sacramento, CA, April 13, 2009 (Meyer et al. 2009).

The idea that flows influence diatom abundance is not new in the Delta. Lehman 1996 and 2000[385] associated a multi-decadal decrease in the proportional biomass of diatoms in the Delta and Suisun Bay to climatic influences on river flow. Regional Board staff recently found that current speed in the Sacramento River was related to the difference in phytoplankton biomass between Freeport and Isleton.[386]

Additionally, top-down effects on phytoplankton composition—caused by selective grazing by clams and zooplankton—are not acknowledged in the Permit, but are likely to influence the species composition of phytoplankton in the SFE, and may contribute to the occurrence of *Microcystis*.[387] Clam grazing selectively removes larger particles from the water column;[388] clams may consume a larger fraction of diatoms than smaller plankton taxa such as flagellates. Kimmerer 2005[389] attributed a step decrease in annual silica uptake after 1986 to efficient removal of diatoms by *C. amurensis* after its introduction in 1986. Grazing by *Corbicula fluminea* can cause shallow habitats in the freshwater Delta to serve as a net sink for phytoplankton.[390] Thus, it is possible that diatoms are differentially affected by benthic grazing (as compared to motile or buoyant taxa) in both the brackish and freshwater Delta. Significantly,

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[385] Lehman, P.W. 1996. Changes in chlorophyll-a concentration and phytoplankton community composition with water-year type in the upper San Francisco Estuary. (pp. 351-374) In Hollibaugh, J.T, (ed.) San Francisco Bay: the ecosystem. San Francisco (California): Pacific Division, American Association for the Advancement of Science (Lehman 1996).

Lehman, P.W. 2000. The influence of climate on phytoplankton community biomass in San Francisco Bay Estuary. Limnol. Oceanogr. 45:580-590 (Lehman 2000).

[386] Foe et al. 2010, p. 13.

[387] District's October 2010 Comments and Evidence Letter, pp. 31-32; Engle Written Testimony, p. 4.

[388] Werner, I., and J.T. Hollibaugh. 1993. *Potamocorbula amurensis*: Comparison of clearance rates and assimilation efficiencies for phytoplankton and bacterioplankton. Limnol. Oceanogr. 38:949-964 (Werner & Hollibaugh 1993).

[389] Kimmerer 2005.

[390] Lopez, C.B., J.E. Cloern, T.S. Shraga, A.J. Little, L.V. Lucas, J.K. Thompson, and J.R. Burau. 2006. Ecological values of shallow-water habitats: implications for the restoration of disturbed ecosystems. Ecosystems 9:422-440 (Lopez et al. 2006).

Parchaso F., and J. Thompson. 2008. *Corbicula fluminea* distribution and biomass response to hydrology and food: A model for CASCaDE scenarios of change. CalFed Science Conference, Sacramento, CA. October 2008 (Parchaso & Thompson 2008). Avail at http://cascade.wr.usgs.gov/CalFed2008.shtm.

benthic grazing has been implicated as a factor favoring *Microcystis* over other phytoplankton.[391] Grazing by zooplankton can also exert a top-down effect on phytoplankton composition.[392]

ii. The Permit Fails to Include Evidence That a Shift in Phytoplankton Composition in the Estuary Represents a Degradation of Food Resources at the Bottom of the Food Web

The Permit references a shift in phytoplankton composition that has been observed in the upper SFE (the brackish and freshwater Delta), characterized by a decline in the relative abundance of diatoms and an increase in other taxa (e.g., flagellates, green algae, and cyanobacteria) as one possible hypothesis as to how discharges of ammonia from the SRWTP may be affecting the aquatic life beneficial uses.[393] With this hypothesis, it is automatically assumed in the Permit that these changes in phytoplankton composition signal a deterioration in the quality of food for estuarine mesozooplankton and calanoid copepods in particular, which may then have repercussions for pelagic fish that eat them.

For example, the Permit recites a claim that large diatoms are better food for SFE zooplankton than other classes of phytoplankton.[394] However, there is no direct evidence cited in the Permit or the record that supports this supposition.[395] Further, it is directly contradicted by experimental evidence from Delta research.[396] With the exception of the recent occurrence of the toxic alga *Microcystis*, there is little basis for the assumption that the observed shift in phytoplankton composition is a negative development for the key copepods, which are prey for POD fishes, or for other zooplankton in the estuary.

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[391] See Meyer et al. 2009. p. 4 ["However, in places where filter-feeding mussels and clams overlap with habitat suitable for *Microcystis* (i.e., low salinity), the presence of these invertebrates might enhance bloom formation by selectively rejecting large *Microcystis* colonies. That grazer selectivity can give *Microcystis* a grazer-resistant, competitive advantage over other phytoplankton, as Vanderploeg et al. (2001) reported for zebra mussels (*Dreissena polymorpha*) in the Great Lakes."].

[392] See, e.g., Ger, K.A., P. Arneson, C.R. Goldman, and S.J. Teh. 2010. Species specific differences in the ingestion of *Microcystis* cells by the calanoid copepods *Eurytemora affinis* and *Pseudodiaptomus forbesi*. Short Communication. J. Plankton Research. doi: 10.1093/plankt/fbq071 (Ger et al. 2010). (Selective grazing by the Delta copepod *P. forbesi* was demonstrated as a viable mechanism for promoting *Microcystis* blooms.)

[393] Permit, pp. J-7 to J-8.

[394] Permit, p. J-8.

[395] District's October 2010 Comments and Evidence Letter, pp. 33-34; Engle Written Testimony, p. 4.

[396] District's October 2010 Comments and Evidence Letter, pp. 33-34; Engle Written Testimony, p. 4.

The Regional Board had ample evidence challenging the simplistic diatom → copepod → fish "paradigm" that is used to justify much of the attention regarding ammonia and the SFE food web.[397]

1. Published experiments from the Delta show that key Delta copepods—including the ones that delta smelt eat—actually prefer *non*-diatom types of phytoplankton, and much of the time delta smelt do not consume phytoplankton at all (preferring instead to consume small heterotrophic organisms in the water column).[398] These feeding experiments indicate that the principal calanoid copepods in the estuary (*Acartia* spp., *E. affinis*, *P. forbesi*) prefer motile prey over non-motile prey and heterotrophic prey (e.g., cilliates, heterotrophic dinoflagellates) over phytoplankton.[399] Diatoms are not motile as they lack flagella or other means of locomotion. Thus, Delta copepods do not rely on diatoms—or even on phytoplankton—as a direct food source and frequently discriminate against phytoplankton altogether (even during diatom blooms) depending on season and location in the estuary. In reality, some of the types of phytoplankton preferred by the copepods (e.g., flagellates) are now *more abundant* in the estuary than in previous decades.

2. In adopting the Permit, the Regional Board ignored a large body of literature that indicates direct feeding on diatoms can cause reproductive failure in copepods.[400] This potential harmful effect of diatoms on copepods, first described in the early 1990s, prompted an ongoing re-evaluation of the paradigm that "diatoms-beget-copepods-beget-fish" that has been the subject of considerable research and special workshops and symposia. The harmful effect is caused by

[397] See, e.g., Hearing Transcript, pp. 187:7-193:5; SRCSD Hearing Exhibits, PowerPoint slides 17-19, 22-23; Districts' October 2010 Comments and Evidence Letter, pp. 34-35.

[398] Heterotrophic organisms obtain energy by consuming pre-existing organic matter, as opposed to synthesizing organic matter through photosynthesis.

[399] Bollens, Gretchn C. Rollwagen, Penry, Deborah L. 2003. Feeding dynamics of *Acartia* spp. copepods in a large, temperate estuary (San Francisco Bay, CA) (Bollens & Penry 2003).

Bouley, P. and W.J. Kimmerer. 2006. Ecology of a highly abundant, introduced cyclopoid copepod in a temperate estuary. *Marine Ecology-Progress Series*, 324, 219-228 (Bouley & Kimmerer 2006).

Gifford, S.M., G. Rollwagen-Bollens, and S.M. Bollens. 2007. Mesozooplankton omnivory in the upper San Francisco estuary. *Marine Ecology-Progress Series*, 348, 33-46 (Gifford et al. 2007).

[400] See Ianora, A. and A. Miralto. 2010. Toxigenic effects of diatoms on grazers, phytoplankton and other microbes: a review. *Ecotoxicology*, 19, 493-511 (Ianora & Miralto 2010).

organic compounds (oxylipins), which are released from diatom cells when they are broken during feeding. These compounds then induce genetic defects in copepod eggs. The genetic defects are manifested by a failure of the eggs to hatch or a failure of hatched offspring to develop normally. These effects are unrecognized in lab or field studies that rely on egg counts to determine the nutritional status of copepods because the harmful compounds involved do not affect the numbers of eggs produced, but the viability of the eggs that are produced. There are at least 24 recent experiments indicating harmful effects of diatom grazing for copepod species pertinent to the SFE (i.e., SFE species and their cofamilials).[401]

3. The reproductive implications of food *choices* are virtually unstudied for the copepods of the SFE. For example, a recent review of almost 400 research articles revealed that only three published studies measured egg production or hatching success for SFE-pertinent copepod species fed mixtures of diatoms and non-diatoms.[402] In other words, there is essentially no direct evidence that observed changes in phytoplankton composition in the estuary would have had population-level consequences for copepods.

4. Non-diatom classes of phytoplankton (including some groups which are now more abundant in the estuary) include species that are considered highly nutritious for zooplankton. Examples include cryptophytes (e.g., *Cryptomonas* and *Rhodomonas* spp.) and *Scenedesmus* spp. (e.g., some species of green algae), which are used as food to rear zooplankton in laboratories.

5. Chlorophyll-a levels below 10 μg/L are frequently cited as evidence that zooplankton in the Delta are food limited.[403] However, this threshold is based on growth experiments conducted with a single cladoceran zooplankton species (*Daphnia magna*). It is unclear whether the threshold is appropriately applied to any of the copepods in this system.

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[401] See Figure 12; see also District's October 2010 Comments and Evidence Letter, p. 35; Engle Written Testimony, p. 4.

[402] See Engle, D. 2010c. Slides and Oral Remarks Presented in: *Engle, D. (2010) How well do we understand the feeding ecology of estuarine mesozooplankton? A survey of the direct evidence*. 6th Biennial Bay-Delta Science Conference, Sacramento, CA, September 27-29, 2010, 31 pp. (Engle 2010c).

[403] Müller-Solger, A.B., A.D. Jassby, and D.C. Müller-Navarra. 2002. Nutritional quality of food resources for zooplankton (*Daphnia*) in a tidal freshwater system (Sacramento-San Joaquin River Delta). Limnol. Oceanogr. 47:1468-1476 (Müller-Solger et al. 2002).

6. The heavy reliance of SFE copepods on non-algal foods indicates that detritus-based pathways for energy transfer may contribute more to the pelagic food web in the Delta than has been acknowledged. Such information led the IEP to make the following acknowledgement in its 2007 Synthesis of Results:

> . . . it is possible that the hypothesis that the San Francisco Estuary is driven by phytoplankton production rather than through detrital pathways may have been accepted too strictly.[404]

Copepod	Diatom	Egg Prod.	Hatching Success	Normal Nauplii	Complete Develop.
Acartia tonsa	*Thalassiosira weissflogii*	-			-
	Thalassiosira pseudo nana	-			-
	Thalassiosira weissflogii	+	+		
	Chaetoceros affinis	-			
	Phaeodactylum tricornutum	-	-		
Acartia hudsonica	*Skeletonema costatum*	+			
Acartia clausi	*Thalassiosira rotula*	+	-		
Centropages typicus	*Thalassiosira rotula*	-	-		
Temora stylifera	*Thalassiosira rotula*	-		-	-
	Skeletonema costatum			-	-
	Phaeodactylum tricornutum			-	-
	Thalassiosira rotula	+	-		
	Thalassiosira weissflogii	+	-		
	Phaeodactylum tricornutum	-	-		
	Skeletonema costatum	-	-		
	Thalassiosira rotula	+	-		
Temora longicornis	*Thalassiosira rotula*				+
	Thalassiosira weissflogii				+
	Leptocylindricus danicus				+
	Skeletonema costatum				+
	Chaetoceros affinis				-
	Chaetoceros decipiens				-
	Chaetoceros socialis				-
	Thalassiosira rotula				-
	Thalassiosira pseudo nana				-
	Thalassiosira rotula	+	-		
	Thalassiosira weissflogii	+	-		
	Chaetoceros affinis	+	-		
	Leptocylindricus danicus	-	-		
	Skeletonema costatum	-	-		

Figure 12. Reproductive consequences of direct feeding on diatoms for Delta copepod taxa. Experiments listed used copepod species from the Delta or their cofamilials. Positive (green) and negative (red) outcomes are indicated for four measures of reproductive success in feeding experiments: egg production (clutch size), hatching success, normal nauplii, and complete development of nauplii. Data are from the review of Ianora & Miralto 2010[405] and other published literature reviewed in Engle 2010c.[406] Figure is from Engle 2010c.

[404] Baxter, R., R. Breuer, L. Brown, M. Chotkowski, F. Feyrer, M. Gingras, B. Herbold, A. Müller-Solger, M. Nobriga, T. Sommer, and K. Souza. 2008. Pelagic organism decline progress report: 2007 Synthesis of results. Interagency Ecological Program for the San Francisco Estuary (Baxter et al. 2008), p. 25.

[405] Ianora & Miralto 2010.

[406] Engle 2010c.

iii. Hypothesis Regarding Inhibition to Diatoms Is Not an Appropriate Water Quality Criteria

The Permit includes a finding that "[r]ecent studies provide evidence that ammonia from the SRWTP discharge is contributing to the inhibition nitrogen uptake by diatoms in Suisun Bay."[407] However, the Permit fails to properly support this finding or explain how such a finding leads to the adoption of the final effluent limitations for ammonia. As indicated in sections VI.A.2 and VI.B.1.b.iii above, when interpreting narrative criteria to derive effluent limitations, the Regional Board must conduct a case-by-case evaluation to determine if numerical criteria developed and/or published by other agencies are relevant and applicable.[408]

In this case, the Regional Board relies on experiments conducted by Dr. Richard Dugdale that found ammonia suppression of nitrate assimilation and primary production rates at 0.014 mg-N/L with complete shutdown by 0.056 mg-N/L.[409] Using these results, the Regional Board determined that ammonia concentrations in the Sacramento River from SRWTP discharges would need to be decreased to ensure that ambient levels of ammonia were below these levels. The alleged reduction in effluent concentrations needed are described as "comparable" to those resulting from limits derived from U.S. EPA's ammonia criteria without the consideration of dilution.[410]

While the limits may coincidentally be "comparable," there is no direct relationship between Dugdale's results from his small container experiments and limits derived from the U.S. EPA ammonia criteria. Furthermore, the Permit is void of any bona-fide analysis (e.g.,

[407] Permit, p. F-56.

[408] Basin Plan, p. IV-17.00.

[409] Permit, pp. J-5 to J-6.

[410] Permit, p. J-6 ("[t]hese values [adopted limits] are comparable to the decreases needed for the Delta and for Suisun Bay to eliminate the ammonia impairment of nitrogen uptake and primary production by the phytoplankton community.").

modeling or other approach) which would allow them to determine what reductions in ammonia would result in downstream concentrations.[411]

More importantly, the Regional Board did not comply with applicable regulations and the SIP in establishing the effluent limitations. Its reliance on Dugdale's experiments to interpret the narrative toxicity objective is inappropriate and violates the Basin Plan policy. Specifically, the Regional Board did not conduct a proper case-by-case analysis to determine if the Dugdale information was relevant and appropriate in interpreting applicable narrative criteria. The Permit includes many statements that undermine the relevance and applicability of the Dugdale ammonia inhibition data to SRWTP discharges.[412] With this uncertainty and the over-whelming amount of evidence contrary to the Regional Board's findings, it is improbable to believe that a case-by-case analysis and determination of relevancy actually occurred. Accordingly, the Regional Board has inappropriately relied on the ammonia inhibition hypothesis to find that acute and/or chronic mixing zones are improper due to beneficial use affects in the far field based on unpublished, speculative water quality criteria. Based on all of the information provided above, the Regional Board's findings with respect to far field aquatic life impacts are not supported by the evidence in the record. Further, the Regional Board has failed to comply with federal regulations and state policy that apply when deriving effluent limitations from a determination of reasonable potential to cause or contribute to a violation of a narrative water quality standard (i.e., the narrative toxicity water quality objective). Instead of conducting required case-by-case analyses for each hypothesized criteria and determining if it is relevant to the SRWTP discharge, the Permit incorporates Attachment J, which summarizes the different studies and theories associated with ammonia in the Delta. Attachment J does not include a case-by-case analysis as required by the federal regulations and the Basin Plan. It does not calculate any limits based on alleged

[411] Permit, p. J-6. The Regional Board's statement here was provided for the first time in the revised November Tentative Permit, after the close of the public comment period. (See November Redline Tentative Permit, p. J-6.) Thus, the District had no opportunity to provide written comments on the statements in question related to this hypothesis.

[412] See, e.g., Permit, p. J-5 ("The causes of low primary production are not understood."); Permit, p. J-7 ("The cause of decline is not known . . . . The SRWTP discharge cannot be cause of pigment decline upstream of the discharge point, and may not be contributing to the decline downstream of the discharge point."); see also Staff Report, p. 14 ("The overall impact of nitrate uptake inhibition, particularly on Delta Smelt food, is not completely understood.").

reasonable potential to exceed narrative objectives. Thus, the Permit findings associated with Attachment J and discussed above must be struck down.

2. Denial of Mixing Zones, and Requirements for Full Nitrification Are Inappropriate and Not Necessary to Ensure Compliance With Dissolved Oxygen Water Quality Objectives

In addition to denying dilution based on improper findings with respect to copepods, diatom inhibition, etc., and interpretations of narrative objectives in general, the Regional Board also included a finding related to dissolved oxygen levels in the Delta. Specifically, the Regional Board found: "The Discharger's effluent contains ammonia and BOD at levels that use all the assimilative capacity for oxygen demanding substances in the Sacramento-San Joaquin Delta. This results in no assimilative capacity for other cities and communities to discharge oxygen demanding constituents, which is needed for them to grow despite the fact that most of these cities and communities are already implementing Best Practicable Treatment or Control (BPTC) at their own facilities and SRWTP is not."[413] To reach this conclusion, the Regional Board assumed that "the River at times, is less than the water quality objective of 7.0 mg/L and the Discharger is currently using all the assimilative capacity in the Sacramento River from Freeport to Rio Vista for oxygen demanding constituents."[414] The Regional Board's assumption is based on data collected at Hood by DWR.

There is no dispute that the applicable water quality objective is 7.0 mg/L.[415] There is also no dispute that the objective is intended to protect aquatic species.[416] However, as with other

[413] Permit, pp. F-56 to F-57. The District objects to the statements made with respect to SRWTP effluent using all assimilative capacity for oxygen demanding substances and that certain communities already are implementing BPTC and will be harmed. The arguments are misplaced and references to BPTC are irrelevant. The effects of the SRWTP discharge occur in the lower Sacramento River between Freeport and Rio Vista and do not extend to other areas in the Delta. Also, few, if any, of the POTWs listed in Attachment J discharge to the lower Sacramento River or its tributaries, and are sufficiently distant from this reach of the Sacramento River to be unimpacted by the allocation of dissolved oxygen assimilative capacity to the SRWTP. (See District's October 2010 Comments and Evidence Letter, pp. 42-43, 46.)

[414] Permit, p. J-10.

[415] Basin Plan, p. III-5.00 ("Within the legal boundaries of the Delta, the dissolved oxygen concentration shall not be reduced below: 7.0 mg/L in the Sacramento River (below the I Street Bridge) and in all Delta waters west of the Antioch Bridge; . . . .").

[416] Hearing Transcript, pp. 127:24-128:1 ("Probably the most sensitive organism [that the 7.0 mg/L objective is intended to protect] is salmon, especially larval salmon moving downstream.").

issues related to the Regional Board's denial of mixing zones for ammonia, the Permit finding has basic flaws, both technical and legal/regulatory in nature.

The technical issues concern the applicability of DWR's Hood data versus model results, recent data results, and the inability of anyone to explain the low bias of data from Hood. The Regional Board used the data discrepancy to reject the District's Low Dissolved Oxygen Prevention Assessment (LDOPA) report (LDOPA 2010)[417] conclusions and found that full nitrification is necessary to ensure compliance with the dissolved oxygen objective. However, as shown below, the data in question is suspect and not a proper basis for rejecting the LDOPA 2010 model results, or reliable to make findings with respect to assimilative capacity. Further, the Regional Board fails to make any meaningful distinctions between the LDOPA 2010's Wet season and Dry season conclusions and instead portrays the Wet season conclusions as the only relevant conclusions.

The legal/regulatory issue concerns the irrelevance of the dissolved oxygen question to the granting or denial of a mixing zone related to the narrative toxicity objective. The Regional Board's findings have no logical or rational connection to the calculation of effluent limitations for ensuring compliance with the dissolved oxygen objective. Certainly, the Regional Board can develop numeric limitations for oxygen demanding substances including ammonia as a WQBEL based on proper analysis and compliance with applicable laws and regulations. But the denial of mixing zones for ammonia here has nothing to do with that issue.

a. DWR Hood Data Is Unreliable and Should Not Be Relied Upon

As discussed at length and explained in the District's October 2010 Comments and Evidence Letter, the LDOPA 2010, which includes a model, shows that at current SRWTP performance and a discharge rate of 181 mgd, dissolved oxygen concentrations in the Sacramento River downstream of the SRWTP do not and would not drop below the 7.0 mg/L Basin Plan objective during the Wet season from November 1 through April 30.[418] Conversely, the

[417] Sacramento Regional County Sanitation District, Low Dissolved Oxygen Prevention Assessment, prepared by Larry Walker Associates (May 2010) (LDOPA 2010).

[418] District's October 2010 Comments and Evidence Letter, p. 40; see also LDOPA 2010.

LDOPA 2010 did show that reduction in ultimate oxygen demanding (UOD) substances (i.e., BOD and/or ammonia) were needed in SRWTP effluent during the Dry season period of May 1 through October 31 to ensure that for future conditions, including potential critical drought periods, dissolved oxygen concentrations in the Sacramento River downstream of the SRWTP remain above the applicable Basin Plan objective of 7.0 mg/L.[419] Based on these findings, the LDOPA 2010 recommended that the Regional Board adopt seasonal UOD limits of 275,000 lbs/day AMEL and 438,000 lbs/day MDEL for the Wet season and 169,000 lbs/day AMEL and 234,000 lbs/day MDEL for the Dry season.[420] The District's recommendations for UOD limits are proper WQBELs as they are designed to ensure compliance with the adopted water quality objective for dissolved oxygen.[421] Specifically, by controlling the amount of UOD in the effluent, receiving water dissolved oxygen objectives can be met.[422]

The Regional Board staff rejected the District's recommendations, claiming that although the model was technically sound, there were concerns with the data used (or not used) to calibrate the model.[423] Specifically, the Regional Board staff stated that it may only discard data, "if certified information from a laboratory, or other quality assurance/quality control (QA/QC) is made available to illustrate that the data is not representative of the water sample."[424] The Regional Board then concludes, "[t]here is no sufficient evidence to discard the DWR data."[425] In all cases, the Regional Board's determinations are not supported by evidence in the record and fail to comply with applicable state and federal regulations.

The data set in question shows dissolved oxygen concentrations at Hood to be below 7.0 mg/L at times.[426] However, due to concerns with the data, the District and others found it

[419] District's October 2010 Comments and Evidence Letter, p. 40; see also (LDOPA 2010).

[420] LDOPA 2010, p. 2/25, as corrected in Table 5 Correction for May 2010 LDOPA (August 30, 2010), attached to email from Vyomini Pandya to Kathleen Harder (August 30, 2010).

[421] See 40 C.F.R. § 122.44(d)(1)(iii).

[422] LDOPA 2010.

[423] Staff Response to Comments, p. 53.

[424] Staff Response to Comments, p. 53.

[425] Staff Response to Comments, p. 53.

[426] See Staff Response to Comments, p. 53.

inappropriate to use this data to calibrate the LDOPA 2010 model.[427] First, it is important to note that the LDOPA 2010 model was found to be technically sound by the Regional Board's technical consultant (Tetra Tech) as well as Regional Board staff.[428] No evidence was presented by Regional Board staff, or anyone else, to discount or change this finding regarding the model itself.[429]

As was explained at the Regional Board hearing, the LDOPA 2010 model could not replicate the results portrayed in the DWR Hood data.[430] Further, side-by-side comparisons of DWR's Hood data to new 2010 data collected under a Regional Board reviewed and approved rigorous and well-designed Quality Assurance Plan[431] indicate that there is a low bias problem with DWR's continuous data at Hood.[432] The issue of low bias is documented not only in technical memorandum submitted by the District[433] but also by the Regional Board's technical experts.[434]

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[427] See, e.g., Memorandum to Bob Seyfried, SRCSD, from Mitch Mysliwiec, Larry Walker Associates, *SRCSD DO Continuous Monitoring Preliminary Results and Ambient DO Datasets Assessment* (July 14, 2010) (DO Data Memo), pp. 12-21.

[428] Staff Response to Comments, p. 53; see also Permit, p. F-33.

[429] See Hearing Transcript, p. 236:3-5 (the Executive Officer engaged in a discussion with the Regional Board regarding the elimination of Hood data and the model's inability to replicate the information. However, during this exchange no evidence or finding was made to suggest that the District's model was not sound).

[430] Hearing Transcript, p. 234:4-10 ("When we looked at the Rio Vista data, our model could pretty well replicate what's going on. But when we tried to match our data to Hood station, it was nearly impossible to match our model to the Hood data. If we tried to . . . input numbers into the model, the oxygen sag would go so low at Hood it would continue to go down.").

[431] See Email from Kathleen Harder to Robert Seyfried (March 25, 2010); see also DO Data Memo, pp. 3-12.

[432] Regional Board staff suggests that the District's data showed an upward bias. (Staff Report, p. J-10.) However, Regional Board staff provides no evidence indicating that the District's data had any QA/QC concerns. To the contrary, the District's data was collected under a very rigorous QA/QC plan (see fn. 261), while email correspondence between Regional Board staff and DWR staff indicate that there have been problems with DWR's Hood data in the past. (See, e.g., DO Data Memo, Appendix B [Email from Mike Dempsey, DWR staff, to Kathleen Harder, Regional Board (Feb. 25, 2009) (provides information with respect to upward adjustments of dissolved oxygen data at Hood)].)

[433] DO Data Memo.

[434] Email from Jim Parker of PG Environmental to Kathleen Harder (July 19, 2010) ("1. The new 2010 DO data appear to be collected under a rigorous and well-designed QA plan. 2. Side-by-side comparisons for April-June confirm that there is a low bias problem with CDEC continuous data at Hood. The reason for this low bias is not known with certainty, but likely relates to fouling of the plastic membrane on the Clark Cell sensor . . . .").

Due to this low bias, which was further confirmed by the District's 2010 data referenced in J. Parker's email, the District determined it necessary to exclude the Hood data in the calibration of its model. This decision was supported by the Regional Board's technical consultant, Tetra Tech. "Unfortunately, the DO data obtained at Hood during most of 2008 may be incorrect . . . In any case, the data at Hood do not appear usable for calibration at this time."[435] On the other hand, the only information the Regional Board staff presents to suggest that the data are valid is that they asked DWR staff to review the Hood data collected from June 2008 through December 2009, and DWR staff reported that in many instances the dissolved concentrations at Hood were below 7.0 mg/L.[436] The Regional Board presents no other evidence to support the validity of the Hood data in question. Conversely, an email exchange between Regional Board staff and DWR staff suggest that the DWR Hood data has had low bias issues in the past and has been corrected upwards on numerous occasions.[437] Regional Board staff also provided testimony that they too share concerns with the DWR Hood data: "Dissolved oxygen, the district referred to a number of letters from Tetra Tech and others about problems with the Department of Water Resources Hood data. We absolutely agree with those letters. We are concerned about that data."[438]

The Regional Board has general authority and responsibility to disregard unreliable and un-representative data. Contrary to its representation, such discretion is not limited to certified information from a laboratory or other QA/QC information.[439] With respect to dissolved oxygen data, there are no controlling or applicable regulations relative to the Regional Board's review and acceptability of receiving water data. The SIP, on the other hand, provides as follows:

> When implementing the provisions of this Policy, the RWQCB shall use all available, valid, relevant, representative data and information, as determined by the RWQCB. The RWQCB shall have discretion to consider if any data are inappropriate or insufficient for use in implementing this Policy. Instances where

[435] LDOPA 2010, p. 6.

[436] Permit, p. J-10.

[437] DO Data Memo, Appendix B, Dempsey Email.

[438] Hearing Transcript, p. 426:21-25.

[439] See Staff Response to Comments, p. 53.

> such consideration is warranted include, but are not limited to, the following: evidence that a sample has been erroneously reported or is not representative of effluent or ambient receiving water quality; questionable quality control/quality assurance practices; and varying seasonal conditions.[440]

Although not directly controlling, the SIP's provisions here explain well the Regional Board's discretion and responsibility with respect to data review. Further, unless specifically stated in the Permit, the Regional Board relies on section 1.3 of the SIP to conduct its reasonable potential analysis for both CTR and non-CTR constituents.[441] The SIP's reasonable potential analysis under section 1.3 incorporates the data provisions cited directly above.[442] Thus, the SIP's data provisions are instructive.

As indicated, and as is pragmatic, the Regional Board has the discretion to disregard or consider only data insufficient if there is evidence that a sample (or samples) is not representative of ambient receiving water quality.[443] In fact, the Regional Board has exercised this discretion on numerous occasions.[444] Clearly, the evidence provided above, including conclusions by the Regional Board's technical consultant, indicates that the DWR Hood data are not representative of ambient receiving water conditions for dissolved oxygen.

Despite the substantial evidence in the record calling into question the validity of the Hood data, or at the very least their use in calibrating the model, the Regional Board used this alleged "discrepancy" to conclude at times the river fails to comply with the water quality objective of 7.0 mg/L and, therefore, by extension, full nitrification of the effluent is required.

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[440] SIP, p. 5.

[441] See Permit, p. F-45.

[442] SIP, p. 6.

[443] See *In the Matter of the Petition of Environmental Law Fndn., et al. re City of Tracy Wastewater Treatment Plant*, State Board Order WQ 2009-0003 (May 19, 2009) (Tracy Order), p. 18; *In the Matter of the Petitions of Chevron U.S.A. Inc., et al.*, State Board Order WQO 2002-0011 (July 18, 2002), pp. 11, 19.

[444] See, e.g., Order No. R5-2009-0009 (Maxwell Public Utilities District), pp. F-29 to F-30; Order No. R5-2008-0184 (City of Colusa), p. F-20; Order No. R5-2008-0057 (Ironhouse Sanitary District), p. F-24; Order No. R5-2008-0053 (City of Placerville), p. F-23.

b. Full Nitrification Is Unrelated to Compliance With Dissolved Oxygen Objective

Setting aside the data quality issue discussed above, the compliance or non-compliance with dissolved oxygen objectives has nothing to do with granting or denying the ammonia mixing zones in question, and the Regional Board made no determination of any appropriate limit of oxygen demand to implement the numeric dissolved oxygen objective. The Regional Board provides no explanation or basis as to its their finding that the Sacramento River's occasional failure to comply with the dissolved oxygen objective of 7.0 mg/L at Hood results in the need for the adopted ammonia limits and full nitrification.[445] The Permit references the need, and the District agrees in part, that the District will need to reduce oxygen demanding constituents in SRWTP effluent to ensure ongoing consistent compliance with the Basin Plan water quality objective.[446] Accordingly, the District proposed seasonal UOD limits, as discussed above. Although the Regional Board rejected the District's proposed limits, no actual reason was provided to explain why the District's proposed UOD limits would not ensure compliance with the dissolved oxygen objective.[447] At most, the Regional Board claims that the Wet season ammonia limits should be the same as the Dry season limits.[448] Based on this logic, the Regional Board should have adopted a UOD limits of 169,000 lbs/day as the AMEL, and 234,000 lbs/day as the MDEL, both to be applied year-round. Instead, the Regional Board makes a huge and unsubstantiated leap to say that the District is using all of the river's assimilative capacity and therefore *full* nitrification is BPTC.

The Regional Board's illogical approach fails to comply with federal regulations, the SIP, and technical support documents for the adoption of water quality-based effluents limits. Federal regulations provide that when a permitting authority finds that a discharge has reasonable

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[445] See Permit, pp. F-56 to F-57, J-9 to J-10.

[446] Permit, p. J-9; Hearing Transcript, p. 226:8-11 (Testimony of Stan Dean, District Engineer, "Removing about half of the ammonia is [] prudent to address future conditions. Removing about half the ammonia comes from our proposal for the ultimate oxygen demand.").

[447] See Permit, p. J-10.

[448] See Permit, p. J-10.

potential to cause, or contribute to an in-stream excursion above the applicable numeric water quality criteria, the permit must contain effluent limitations for that pollutant.[449] In this case, the water quality criterion is the 7.0 mg/L water quality objective for dissolved oxygen.[450] Although dissolved oxygen is not technically a pollutant, the discharge of oxygen demanding substances can cause dissolved oxygen levels in the receiving water to fall below levels necessary to protect aquatic life beneficial uses.[451] The oxygen demanding substances at issue here are ammonia and BOD. Thus, assuming the Regional Board makes a finding of reasonable potential for dissolved oxygen, it should follow appropriate procedures to calculate an effluent limitation (or limitations) for oxygen demanding substances (i.e., UOD).[452] This has not occurred here.

First, there is no finding of reasonable potential directly related to dissolved oxygen.[453] Second, the Permit fails to include any discussion or calculation of an appropriate effluent limitation (or limitations) for oxygen demanding substances that is directly related to ensuring compliance with the dissolved oxygen objective far downstream in the receiving water.[454] At most, the Regional Board finds fault with the District's proposed Dry season UOD limit but does not offer or identify an alternative limit for UOD.[455]

Considering the Regional Board's failure to make any connection between full nitrification and compliance with dissolved oxygen objectives downstream of SRWTP's point of discharge, the Regional Board improperly used dissolved oxygen as an excuse to deny mixing zones for ammonia, or to find full nitrification is BPTC.

[449] 40 C.F.R. § 122.44(d)(1)(iii).

[450] Basin Plan, p. III-5.00.

[451] Permit, p. J-8.

[452] See 40 C.F.R. § 122.44(d).

[453] See Permit, pp. F-53 to F-86 (section identifies constituents with reasonable potential and dissolved oxygen is not included); see also Permit, Attachment G, p. G-1 (Summary of Reasonable Potential Analysis).

[454] See Order No. WQ 95-4, *supra*, pp. 21-22 (regional board's rationale for calculating permit limits must be expressed in the permit findings and fact sheet).

[455] Permit, p. J-10.

3. The Presence of Nitrosodimethylamines, a Nistrosoamine, Is an Improper Basis to Deny Ammonia Mixing Zones or Find That Full Nitrification Is Required

In addition to the other findings discussed above, the Permit includes a finding with respect to nitrosoamines to support the Regional Board's denial of mixing zones and by extension, requirement for full nitrification. Specifically, the Permit finds that the Discharger's effluent contains "nitrosoamines at levels that are greater than 100 times the primary MCL."[456] This finding is unsupported for several reasons, some of which are similar to those discussed previously.

First, there is no primary maximum contaminant level (MCL) for nitrosoamines in general, or the specific nitrosoamines such as nitrosodimethylamines (NDMA). DPH has published drinking water notification levels for NDMA and two other nitrosoamines. Notification levels are intended "to provide information to public water systems and others about certain non-regulated chemicals in drinking water that lack maximum contaminant levels."[457] Thus, by definition, notification levels are not MCLs.

Further, DPH considers notification levels to be advisory in nature and NOT enforceable standards.[458] Because, there exists no Primary MCLs for nitrosoamines, any finding suggesting otherwise is improper. Next, although the State Board has indicated that it might be appropriate to use notification levels in some instances, appropriate findings must be made when doing so.[459] No such findings have been made in this Permit. To the extent the Regional Board intended to reference notification levels versus MCLs in the Permit, it needed to include findings and supportive evidence explaining why it was appropriate and relevant to apply notification levels as water quality criteria. Again, the Permit includes no such findings.

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[456] Permit, p. F-57.

[457] Drinking Water Notification Levels and Response Levels: An Overview (Dec. 14, 2010), p. 2; see also *In the Matter of the Petition of Water Replenishment District of Southern California, et al.*, State Board Order WQ 2006-0001 (April 5, 2006) (*Petition for Water Replenishment District*), p. 2.

[458] Drinking Water Notification Levels and Response Levels: An Overview (Dec. 14, 2010), p. 4; see also *Petition of Water Replenishment District*, *supra*, p. 2.

[459] *Petition for Water Replenishment District*, p. 4.

With respect to NDMA, the California Toxics Rule (CTR) contains a criterion of 0.00069 μg/L for the protection of human health.[460] The Permit conducts a reasonable potential analysis for NDMA pursuant to the SIP's procedures and finds reasonable potential.[461] The District disagrees with the Permit's findings regarding lack of assimilative capacity and denial of a dilution credit.[462] However, the Permit otherwise follows the SIP procedures correctly and calculates effluent limitations for NDMA accordingly, and the Regional Board properly adopted a time schedule for NDMA in the TSO in accordance with relevant statutory provisions.[463]

However, the finding in question is, again, completely unrelated to whether or not it is appropriate to grant or deny mixing zones related to the narrative toxicity objective and U.S. EPA criteria for the protection of aquatic organisms. Further, the Regional Board's alleged connection between nitrosoamines and full nitrification is unfounded. The connection is based on a non-existent Primary MCL and represents an attempt to dictate the manner of compliance in violation of Water Code section 13360. Water Code section 13360 states, "[n]o waste discharge requirement or other order of a regional board, or the state board or decree of a court issued under this division shall specify the design, location, type of construction, or particular manner in which compliance may be had with that requirement, order, or decree, and the person so ordered shall be permitted to comply with the order in any lawful manner." Based on this provision, the District may comply with the effluents for NDMA in any lawful manner the District chooses, which may or may not include full and/or partial nitrification. As indicated in the Infeasibility Analysis for the SRWTP submitted to the Regional Board, the District intends to monitor influent data to determine if there are influent sources.[464] If so, the District will perform a comprehensive NDMA source identification study, which has not been conducted for the SRWTP service area because

[460] 40 C.F.R. § 131.38(b)(1), column D.

[461] Permit, pp. F-62 to F-63.

[462] See District's October 2010 Comments and Evidence Letter, pp. 47-49.

[463] Permit, pp. F-62 to F-63; Wat. Code, §§ 13300, 13385(j)(3).

[464] Sacramento Regional Wastewater Treatment Plant Infeasibility Analyses and Compliance Schedule Justifications (Aug 2010) (Infeasibility Analyses), p. 45.

NDMA was not previously identified as a pollutant of concern.[465] The District will also explore treatment process optimization. Based on the results of these efforts, the District will be able to determine the best method to ensure compliance with NDMA limits by December of 2015.

Accordingly, any denial of mixing zones for ammonia based on nitrosoamines is inappropriate. Also, as with other issues discussed above, if the Regional Board desired to regulate based on nitrosamines it was required to comply with applicable law for development of WQBELs. And, any finding in the Permit that suggests the District must implement full nitrification to comply with effluent limitations for NDMA is also inappropriate and must be removed.

4. Finding for Denial of Mixing Zones and Requirements for Full Nitrification Based on Un-Published Draft U.S. EPA Criteria Are Not Appropriate

The Permit references the existence of *Draft 2009 Update Aquatic Life Ambient Water Quality Criteria for Ammonia – Freshwater* (Draft Ammonia Criteria) as one reason for denying dilution credits and requiring full nitrification.[466] Any reliance on the Draft Ammonia Criteria is misplaced because it is a draft and not available for use in a regulatory setting. In an email exchange between Regional Board staff and U.S. EPA staff that is part of the Permit record, U.S. EPA indicated that the Draft Ammonia Criteria would not be published until 2011. At this time, the science has not been completed and the Draft Ammonia Criteria have not been peer reviewed.[467] Both are critical steps to determining the appropriateness and validity of the Draft Ammonia Criteria. Further, U.S. EPA cautioned that the Draft Ammonia Criteria must be published by U.S. EPA and adopted by the states into their water quality standards ". . . before the value is adopted, legally binding and useful in permits."[468]

Regional Board staff stated that it has the discretion to use the Draft Ammonia Criteria to interpret the Basin Plan's narrative toxicity objective.[469] However, when using criteria to interpret

[465] Infeasibility Analyses, p. 45.

[466] Permit, pp. J-3 to J-4; see Staff Response to Comments, p. 25.

[467] Staff Response to Comments, p. 25.

[468] Email Exchange Between Kathleen Cole Harder, RWQCB, and Lisa Foersom Huff, U.S. EPA (Aug. 2, 2010).

[469] Staff Response to Comments, p. 25.

narrative water quality objectives, the Regional Board must make appropriate findings and comply with the applicable processes under state and federal law discussed previously.[470] The Permit does not include any findings to this effect and does not claim to do so.[471]

Even if the Draft Ammonia Criteria were applicable, there would still be insufficient reason to deny a dilution credit to discharges from the SRWTP. The Regional Board approved the District's model and mixing zones for chronic criteria.[472] The Draft Ammonia Criteria includes a chronic criterion.[473] Further, in a year-long nutrient study conducted by the Regional Board, "[a]mbient concentrations never exceeded the criteria."[474] Thus, assimilative capacity for ammonia is available even if the more stringent Draft Ammonia Criteria are inappropriately used.

The District notes and agrees with the statements in the Permit that it is appropriate to use U.S. EPA ammonia criteria to interpret the narrative toxicity objective. As indicated in Attachment J of the Permit, "when the approved mixing zones are considered, [the SRWTP's discharge] is in compliance with current USEPA acute and chronic ammonia criteria."[475] Conversely, it is inappropriate to use the Draft Ammonia Criteria as a basis for denying dilution credits or mixing zones for ammonia because the draft criteria are not approved by U.S. EPA.

Further, it is important to properly characterize the Draft Ammonia Criteria and their relevance for evaluating impacts on POD species. Specifically, the Draft Ammonia Criteria are more stringent than the adopted U.S. EPA ammonia criteria due to the consideration of ammonia toxicity to sensitive freshwater mussels. In fact, the Draft Ammonia Criteria are proposed to be bifurcated into separate categories, depending on the presence or absence of sensitive freshwater mussel species in a water body. The "without mussels present" criteria, which are driven by the

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[470] See State Board Order No. WQ 95-4, *supra*, p. 13 (rationale for more stringent limits must be explained in the permit and be supported by evidence in the record).

[471] Staff Response to Comments, p. 25.

[472] Letter from Kenneth D. Landau to Mary K. Snyder, Acceptance of Sacramento Regional County Sanitation District's Dynamic Mathematical Model for Use in NPDES Permit Renewal for the Sacramento Regional Wastewater Treatment Plant (April 2, 2009) (Dynamic Model Acceptance Letter); Permit, pp. F-35 to F-36.

[473] Permit, p. J-3.

[474] Permit, p. J-3.

[475] Permit, p. J-1.

protection of sensitive fish species, are no more stringent than the U.S. EPA ammonia criteria, which are currently driven by the protection of sensitive fish species such as rainbow trout and salmonids. In other words, with respect to the protection of Delta POD fish species, there is little difference between the U.S. EPA ammonia criteria and the Draft Ammonia Criteria. Therefore, evaluations of ammonia toxicity to Delta fish using the U.S. EPA ammonia criteria will continue to provide meaningful and pertinent conclusions going forward, regardless of the status of the finalization and adoption of the Draft Ammonia Criteria.

5. Full Nitrification Is Not Justified Via State Board Resolution No. 68-16

The Permit also includes a finding that, "[t]he Discharger must fully comply with Resolution No. 68-16 that requires Best Practical Treatment and Control, which for this discharge includes nitrification and denitrification of their wastewater."[476] For the reasons described in section VIII, *post*, the District disagrees that State Board Resolution No. 68-16 requires implementation of those advanced treatment requirements, including full nitrification. As discussed below, State Board Resolution No. 68-16 is designed to protect high-quality waters. However, it is not a zero-degradation policy. It generally requires that when permitting degradation, the Regional Board is required to ensure that additional degradation occurs pursuant to limits that require BPTC and that the additional degradation is to the maximum benefit to the people of the state. The determination of BPTC takes into consideration a number of factors including the consideration of alternatives. In this case, the Permit fails to consider alternatives with respect to partial nitrification that would result by adopting UOD limits as being BPTC. As discussed in section VI.B.2, *supra*, partial nitrification would ensure protection of beneficial uses, which is the primary goal of State Board Resolution No. 68-16.

Further, like with all of the other findings designed to support the Regional Board's denial of mixing zones for ammonia, the finding does not bridge the analytical gap between the evidence and the Regional Board's ultimate determination (i.e., no mixing zones), and the finding is not supported by evidence in the record. Accordingly, the finding is improper and void.

[476] Permit, p. F-57.

VII. THE PERMIT IMPROPERLY INCLUDES FINAL EFFLUENT LIMITATIONS AND DENIES A MIXING ZONE FOR NITRATE BASED ON ALLEGED AND UNEXPLAINED FAR FIELD IMPACT

The Permit includes an AMEL for nitrate of 10 mg/L derived from application of the Primary MCL of 10 mg/L (as nitrogen) at the end-of-pipe without the consideration of dilution.[477] The Regional Board denied the granting of a human health mixing zone for nitrate, determining that "a human health mixing zone for nitrate does not meet the mixing zone requirements of the SIP."[478] As with ammonia, the Permit refers to three SIP criteria that were determined not to be met: the Regional Board determined the mixing zone would "compromise the integrity of the entire water body, adversely impacts biologically sensitive or critical habitats, and produce undesirable or nuisance aquatic life."[479]

As in the case of ammonia, the denial of a nitrate mixing zone is flawed in multiple respects. First, the denial has nothing to do with the merits of a human health mixing zone. Second, the Permit findings fail to "bridge the analytic gap between the raw evidence and ultimate decision or order."[480] In this regard, the Permit is even more deficient for nitrate than it is for ammonia. In particular, as a prelude to determining that the SIP criteria are not met, the Permit states that "elevated nitrogen discharges from the Facility have been shown to be negatively affecting the receiving water far downstream of the discharge within the Delta[.]"[481] But there are *no findings whatsoever* to support this conclusion. In other words, for nitrate or nitrogen, there is no equivalent to the ammonia "appendix" (Appendix J of the Permit). To the extent Appendix J even discusses nitrogen, the appendix states that effects are "not known."[482] There simply is no linkage of any raw evidence to the determination to deny a mixing zone for nitrate. Third, even if there were a finding linking evidence to the denial, there would be no basis

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[477] Permit, p. 14 (Table 6); pp. F-44 to F-45, F-72.

[478] Permit, pp. F-44 to F-45.

[479] Permit, p. F-45. The September Tentative Permit circulated for public comment did not include a determination to deny a mixing zone for nitrate under the SIP. (See November Redline Tentative Permit, p. F-45 to F-46.)

[480] *Topanga, supra,* 11 Cal.3d, pp. 506, 515.

[481] Permit, p. F-45.

[482] Permit, pp. J-7 to J-8.

to conclude that an effluent limit of 10 mg/L AMEL is necessary to prevent some impact far downstream. In this regard, if impacts related to unspecified downstream uses existed, the MCL for nitrate is not relevant. The Regional Board must implement the applicable narrative water quality objective to derive a WQBEL. The Regional Board has not done so. Overlying all of the above, the Regional Board did not consider the cost of denying the mixing zone or lack of harm associated with a mixing zone.[483]

A. An Effluent Limitation Equal to the MCL Is Unnecessary to Protect MUN Use

The Basin Plan Chemical Constituents Objective incorporates MCLs by reference.[484] The Permit correctly states that if the SRWTP is required to nitrify for ammonia reduction, nitrate concentrations will increase, and as a result of the Permit requirements for ammonia, nitrate in undiluted effluent would exceed the Primary MCL for nitrate of 10 mg N/L.[485]

The Permit explicitly acknowledges that there is assimilative capacity and dilution available for compliance with the Primary MCL.[486] Regional Board staff also stated: "there is sufficient dilution available in the Sacramento River that the river after mixing [with a nitrified effluent] will not exceed the nitrate drinking water standard."[487] The Permit correctly states that there are no known drinking water intakes within the immediate vicinity of the discharge. The closest downstream drinking water diversion is the Barker Slough Pumping Plant, 40 miles distant, which diverts water from Barker Slough into the North Bay Aqueduct.[488] The North Bay Aqueduct supplies water to remote drinking water intakes. Modeling completed by the District indicates that the Sacramento River, and therefore the SRWTP discharge, has little influence on the quality of water in Barker Slough.[489] The Permit properly notes that the effluent will be

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[483] See *In the Matter of the Petition of Yuba City*, State Board Order WQO 2004-0013 (July 22, 2004), p. 12 (regional board must "fully consider information in the record, the high cost to meet the effluent limitations without allowing . . . dilution credit, and the lack of evidence of any harm associated with such a mixing zone.").

[484] Basin Plan, p. III-3.00.

[485] Permit, pp. F-44, F-72.

[486] Permit, p. F-44.

[487] Staff Report, p. 20.

[488] Permit, pp. F-36, F-38, F-40.

[489] District's October 2010 Comments and Evidence Letter, p. 55; see Permit, pp. F-30 to F-40.

sufficiently diluted at downstream drinking water diversion points to meet the Primary MCL.[490] In fact, the Primary MCL will be met by a large margin.

In sum, it is beyond dispute that there is no need for an end-of-pipe limit equal to the MCL to protect the Municipal (MUN).

B. Denial of a Mixing Zone for Nitrate Is Improper

1. The Denial Is Not Based on Findings or Compliance With Regulatory Requirements

In consideration of the above conclusions with respect to the Primary MCL for nitrate, the obvious question is: why is the Permit's final effluent limitation equal to the MCL of 10 mg/L? The Permit does not say. And, there are no findings to support the limit.

As discussed above, the Permit contains a solitary statement asserting the mixing zone is denied because of negative effects of nitrogen "far downstream" within the Delta. What are the negative effects? Where? The Permit does not say. There is no finding linking, or attempting to link, any evidence to any adverse effect.

The Permit findings do refer to hypotheses concerning nitrogen and nitrogen:phosphorous ratios in the Delta.[491] However, the Regional Board made no finding whatsoever linking any evidence to a conclusion that there is a problem with nitrogen concentrations in the Delta, or N:P ratios.[492] The District has addressed these issues elsewhere, and indeed a lowering of N:P ratios could potentially have *adverse* effects.[493] But the critical point is that no adverse impact is even identified in the Permit. Similarly, there is a statement in the Permit that unidentified recent studies have indicated "a possibility" of nitrate toxicity to aquatic organisms.[494] However, there is no finding of any such impact at any nitrate concentration.

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[490] Permit, p. F-44.

[491] Permit, p. J-7.

[492] Permit, pp. J-7 to J-8.

[493] See District's October 2010 Comments and Evidence Letter, pp. 52-55; Engle Written Testimony, p. 4; see also Hearing Transcript, pp. 201:15-202:23; SRCSD Hearing Exhibits, PowerPoint slides 22-23; see section VI.B.1.c.i.(d), *supra*.

[494] Permit, pp. F-71 to F-72.

Of course, were it the case that nitrogen resulted in undesirable changes in algae composition or toxicity (hypotheses described on pages F-71 to F-72 and J-7 to J-8 of the Permit but not endorsed in the Permit), the Basin Plan narrative water quality objective for toxicity or biostimulatory substances would be implicated.[495] In that scenario, the Regional Board would be obliged to determine reasonable potential and establish effluent limits in accordance with applicable law including 40 C.F.R. section 122.44(d)(1)(vi) and the Basin Plan, as discussed in sections VI.A.2, VI.B.1.b.iii, *supra*, of this Statement of Points and Authorities.[496]

2. For the Same and Additional Reasons, Denial Based on the SIP Was Improper

In this case, the Regional Board improperly denied a human health mixing zone and appropriate dilution credits for nitrate, determining that three of the eleven SIP criteria were not met: (1) compromise the integrity of the entire water body; (2) adversely impact biologically sensitive or critical habitats; and (3) produce undesirable or nuisance aquatic life.[497] As described below, the Regional Board's denial of a nitrate human health mixing zone based on these criteria is improper for several reasons, including that: the SIP is not applicable, there exists no evidence that allowing a mixing zone for nitrate will harm aquatic life or other beneficial uses, and the Permit fails to include any explanation, findings, or evidence as to how a human health mixing

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[495] See section VI.A.2, *supra* (quoting Basin Plan narrative objectives for Biostimulatory Substances and Toxicity); see also Basin Plan, p. III-7.00 (narrative Taste and Odors Objective).

[496] The Staff Report and Staff Response to Comments suggest that nitrate causes algal growth and that excessive algal growth can impart undesirable tastes and odors. (See Staff Report, p. 22; Staff Response to Comments, p. 28.) There was also hearing testimony on these subjects, but, as with the Tentative Permit upon which parties commented, not a word in the Permit or its findings supports a determination to deny mixing zones on this basis. In addition, some of this staff material outside the Permit references alleged effects not in the mixing zone or even "within the Delta," but in areas to which water is exported from the Delta. The Staff Report and Staff Response to Comments are not findings of the Regional Board and are not incorporated into the Permit. (See State Board Order No. WQ 95-4, pp. 21-22 [regional board rationale must be expressed in permit findings and fact sheet].) Permit section II.D incorporates Attachments A-K. (Permit, p. 6.) (The District notes that the reference to Attachment "K" is an editing oversight [see November Redline Tentative Permit, p. 3].) There are no findings at all in the Permit or Fact Sheet related to any of these issues or that would support that the nitrate limit of 10 mg/L at the end-of-pipe is necessary to ensure compliance with the narrative biostimulatory substances, or taste and odor objectives, in the Basin Plan. Again, if any narrative objective is to be implemented, the Regional Board must comply with applicable law in determining reasonable potential and establishing numeric limits to implement the narrative objective. Moreover, the link between algal growth and taste and odor is not supported by published literature, which is explained in detail in the Expansion ADA, pp. 4-22 to 4-25.

[497] Permit, pp. F-44 to F-45.

zone for nitrate adversely affects beneficial uses in any way or would not comply with the three SIP criteria if appropriately applied.

a. The SIP Mixing Zone Criteria Do Not Apply

The SIP includes requirements for dilution credits and mixing zones for CTR-based (i.e., priority pollutant) human health criteria. The SIP states: ". . . in establishing and determining compliance with effluent limitations for applicable human health, acute aquatic life, or chronic aquatic life priority pollutant criteria/objectives or the toxicity objective for aquatic life protection in a RWQCB basin plan, the RWQCB may grant mixing zones and dilution credits to dischargers in accordance with the provisions of this section."[498] Nitrate is not a priority pollutant regulated in the CTR, nor is application of the Primary MCL based on the narrative toxicity objective for aquatic life in the Basin Plan.[499] Thus, the development of effluent limits (including the consideration of dilution) is not subject to the SIP.[500]

The Basin Plan includes mixing zone provisions that are applicable to *non-priority* pollutant criteria/objectives. The Basin Plan states that the Regional Board may designate mixing zones provided that, "the discharger has demonstrated to the satisfaction of the Regional Water Board that the mixing zone will not adversely impact beneficial uses."[501] Further, when determining the size of a mixing zone pursuant to the Basin Plan's policy, the Regional Board is to consider the applicable procedures and guidelines in the TSD.[502] The Permit states that the Regional Board considered the Basin Plan policy and TSD procedures and guidelines.[503] However, the Regional Board's determination for nitrate was based specifically on three criteria from the SIP, not the Basin Plan's provisions.

[498] SIP, p. 15.

[499] See 40 C.F.R. § 131.38(b)(1); see also Permit, pp. F-71 to F-72.

[500] See SIP, p. 15.

[501] Basin Plan, p. IV-16.00.

[502] Basin Plan, p. IV-16.00.

[503] Permit, p. F-40.

b. Even Assuming the SIP Applies, the Regional Board Did Not Properly Determine That SIP Criteria Are Not Met

Contrary to the Permit's unsubstantiated determination, a human health mixing zone for nitrate does not compromise the integrity of the entire water body. Based on the District's *Sacramento River Harmonic Mean Mixing Zone Report* (June 2010),[504] the discharge is completely mixed approximately three miles downstream. Accordingly, the Permit allocates dilution credits of 56:1 for human carcinogen criteria, dilution credits of 29:1 for non-human carcinogen criteria, and identifies a human health mixing zone of three miles.[505] In comparison, the Sacramento River extends over 40 miles downstream from the discharge to the San Francisco Bay, and the nearest downstream drinking water intake is the Barker Slough Pumping Plant, also approximately 40 miles downstream.[506] The TSD provides guidance on determining effects on the water body as a whole: "[i]f the total area affected by elevated concentrations within all mixing zones combined is small compared to the total area of a waterbody (such as a river segment), then mixing zones are likely to have little effect on the integrity of the waterbody as a whole, provided that they do not impinge on unique or critical habitats."[507] As with the acute and chronic mixing zones for ammonia discussed above, the human health mixing zone here is small in contrast to the river segment of 40 miles. Moreover, there would be no adverse effect on MUN use from the Sacramento River or Delta. Thus, a human health mixing zone for nitrate will not compromise the integrity of the entire water body. With respect to the remaining two criteria, related to sensitive habitats and nuisance aquatic life, the Regional Board's determinations that the criteria are not met is also unsupported. The Permit provides no reference or explanation or findings linking evidence to its determinations as to how the human health mixing zone for nitrate would adversely impact sensitive or critical habitats. Similarly, there are no findings in the Permit linking any evidence to a determination that the human health mixing zone for nitrate

[504] SRCSD, *Sacramento River Harmonic Mean Mixing Zone Report*, Larry Walker Associates (June 2010).

[505] Permit, pp. F-38 to F-39.

[506] Permit, pp. F-38, F-40.

[507] TSD, p. 34.

requested by the District will produce undesirable or nuisance aquatic life. If this situation existed, the Regional Board would be obliged to determine reasonable potential and appropriate effluent limits implementing the narrative toxicity or biostimulatory substances objective in accordance with federal regulations[508] and the Basin Plan.

C. The Argument for Denitrification to Satisfy State Board Resolution No. 68-16 Is Wholly Inadequate

For the reasons described above and in section VIII, *post*, the District disagrees that Resolution No. 68-16 requires implementation of denitrification requirements.

Nitrate discharge above 10 mg/L AMEL would not cause pollution or nuisance, and there is no basis in the Permit or otherwise to conclude denitrification would provide maximum benefit to the people of the state. Significantly, the Permit does not attempt to explain otherwise. The maximum benefit determination requires a balancing of costs and benefits. The record clearly shows that the Regional Board does not know whether a benefit from denitrification would occur. The record also shows that denitrification would be extremely costly. Therefore, and assuming state and federal antidegradation policies apply,[509] there is no showing of need for denitrification as BPTC.

D. Considerations Related to Remand

In paragraph 6.D of this Petition (preceding this Statement of Points and Authorities) the District requests, among other things, that the State Board vacate the improper effluent limitations for nitrate, and remand with direction to adopt limitations if and as necessary, based on the MCL for nitrate with appropriate allowance of a mixing zone. Whether effluent limitations will be necessary depends upon the outcome of other permitting issues. If, for example, the Regional Board determined that effluent limitations for oxygen demanding substances would likely lead to nitrate levels at end-of-pipe excess of the MCL, a mixing zone would be allowed.

[508] 40 C.F.R. § 122.44(d)(1)(vi).

[509] See section VIII, *post*.

VIII. THE REGIONAL BOARD MISAPPLIED AND MISINTERPRETED ANTIDEGRADATION POLICIES CONTRARY TO LAW AND STATE POLICY

The Permit includes a brief section under the heading "Satisfaction of Antidegradation Policy."[510] Here, in an unprecedented approach to the renewal of a permit for a municipal discharger, the Regional Board undertook to support stringent new permit requirements in the absence of *any* substantive information that the discharge will degrade baseline water quality. The requirements are purportedly based on a new antidegradation "analysis," which, as discussed below, is incomplete, conclusory, and unsupported in fact or law.

Under the applicable "antidegradation" policies, and in practice, regional boards determine whether to allow new discharges or expansions of discharge. Neither circumstance is present here. Instead, the policies have been converted to a shotgunning of superficial arguments for a level of treatment or effluent quality for a previously permitted discharge.

The District fully recognizes that the Regional Board can impose increasingly stringent requirements on a permitted discharge. That is what occurs with water quality-based permitting and the adoption of WQBELs. In this Permit, however, logic, science, and law are lacking as a basis for the WQBELs adopted, and the Regional Board sought to impose the same outcomes in a different way. If this is to be the future of the policies, the State and Regional Boards can do away with water quality planning and simply confirm that there is open-ended authority to dictate outcomes in the regulatory permitting process.

In this section, the District demonstrates that the antidegradation policies were not triggered by the renewal of the Permit. Furthermore, the District explains that even if the policies were triggered, the analyses and conclusions in the Permit are erroneous.

[510] Permit, pp. F-93 to F-99. Certain conclusions set forth in this section of the Permit, such as those regarding BPTC, are repeated elsewhere in the Permit (e.g., Attachment J).

A. Renewal of the District's Permit Did Not Trigger State or Federal Antidegradation Review

The Regional Board determined that the renewal of the District's permit required an antidegradation analysis.[511] This conclusion is contrary to State Board orders and policy, relevant guidance, and the Regional Board's own application of antidegradation policies. Application of the policy is triggered when a regional or state board action will lower existing high quality water.[512] Before approving any reduction in water quality, or any activity that would result in a reduction in water quality, "the Regional Board must first determine that the change in water quality would not be in violation of State Board Resolution No. 68-16 or the federal antidegradation policy."[513] This includes consideration of changes that have already occurred *if they have not previously been reviewed for consistency with those policies.*[514]

Further, State Board guidance clarifies that the policy does not require "antidegradation" analysis when existing water quality will not be reduced by the proposed action.[515] Existing water quality includes water quality *already permitted or authorized*, even if the permitted degradation has yet to occur.[516]

With respect to the federal antidegradation policy, "[t]he first step in any antidegradation analysis is to determine whether or not the proposed action will lower water quality . . . . If the action will not lower water quality, no further analysis is needed and EPA considers 40 CFR 131.12 to be satisfied."[517] State guidance confirms this approach: "The three-part test set forth in

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[511] Permit, p. F-93. State Policy is set forth in the "Statement of Policy With Respect to Maintaining High-Quality Waters in California." (State Board Resolution No. 68-16.) The federal antidegradation policy is codified in regulation. (40 C.F.R. § 131.12.) For convenience, the policies are referred to herein as the state and federal antidegradation policies.

[512] *In the Matter of Petitions of the County of Santa Clara, et al.*, Order No. WQ 86-8 (Resolution No. 68-16 "sets forth the circumstances under which *change* to existing high quality water will be allowed"), p. 28, emphasis added.

[513] *In the Matter of the Petition of Rimmon C. Fay*, Order No. WQ 86-17, p. 17.

[514] *In the Matter of Petitions for Reconsideration of Water Quality Certification for the Re-operation of Pyramid Dam*, Order WQ 2009-0007, p. 12.

[515] Antidegradation Policy Implementation for NPDES Permitting, Administrative Procedures Update 90-004 (APU 90-004), p. 2.

[516] APU 90-004, p. 4.

[517] Guidance on Implementing the Antidegradation Provisions of 40 C.F.R. § 131.12 (June 3, 1987), pp. 3-4.

the federal antidegradation policy is triggered by reduction in surface water quality. The first-step in analyzing the requirements of the federal antidegradation policy as applied to a particular activity is to determine if the activity will lower surface water quality; only if there is a reduction in water quality must the three-part test be applied to determine if the activity may be permitted."[518]

The Regional Board acknowledged that antidegradation analyses were completed prior to the granting of the 181 mgd discharge capacity.[519] The Permit does not allow for an increase in flow or mass for any constituent of concern, except cyanide.[520] Because compliance with the policies was previously considered, and the Permit does not allow for a reduction in water quality, the requirement of an antidegradation analysis under the state and federal antidegradation policies has not been triggered.

The Regional Board's sole basis for asserting that a new analysis should be conducted is that conditions in the Delta have changed.[521] Yet, nothing in the policy or associated guidance requires a new analysis based on subjective evaluation of whether a "change" in some condition has occurred since the time a discharge was originally authorized. The Regional Board has attempted to open a door that does not exist. Moreover, it is not the Regional Board's practice to subject existing permitted discharges to complete antidegradation analyses; instead, such review

[518] Memorandum to Regional Board Executive Officers from William R. Attwater, Chief Counsel, Federal Antidegradation Policy (Oct. 7, 1987) (Attwater Memo re: Federal Antidegradation Policy), p. 3. It is unlawful for the Regional Board to apply or use a policy as a basis of regulation unless the policy has first been proposed, adopted, and approved in accordance with the Administrative Procedures Act (APA). (Gov. Code, § 11340.5.) The antidegradation policies have not been adopted to require analysis for an existing discharge, and application for that purpose would require compliance with the APA.

[519] Permit, p. F-93.

[520] Permit, p. F-9-3. With respect to cyanide, the District performed and submitted a dynamic model, which represents a more accurate picture of mixing zone concentration and therefore supports adoption of the specific Permit limit. (Permit, pp. F-41 to F-42.) The District also provided antidegradation analysis which considered the impacts of increased cyanide discharges at 181 and 218 mgd. That analysis determined that the minor incremental change in cyanide, even at 218 mgd, was consistent with state and federal antidegradation policies.

[521] Permit, p. F-93. Though not clearly delineated, the referenced change is presumably the decline of Delta fish populations. The issue, however, is when and how the policy applies. Moreover, there is no reference in the Permit to any "changed conditions" related to many of the constituents the Permit proposes to regulate more stringently than in the past, including the constituents regulated under the Permit's filtration requirements.

is triggered by the authorization of a new discharge or significant increase in flow rates.[522] Nor is a different policy or practice applicable to Delta dischargers. The recently adopted permit for the City of Rio Vista, which also authorizes discharges to the Sacramento River within the Delta, finds that because the Order did not allow for an increase in flow or mass of pollutants, a complete antidegradation analysis was not necessary.[523]

The Permit stands alone in its approach to antidegradation. In the absence of any basis to deviate from existing policy and practice, the only reasonable inference to be drawn is that the Regional Board began with the decision to dictate advanced treatment and invoked antidegradation in support of the conclusion already reached.

B. The Regional Board Applied the Wrong Baseline

On May 20, 2009, the District submitted an Expansion ADA to support the District's application for a discharge of 218 mgd.[524] By letter dated June 11, 2010, the District withdrew its request for expansion.[525] Once the District's request for expansion was withdrawn, the Expansion ADA and its analysis were no longer required. However, the Regional Board relied upon the Expansion ADA to develop an argument that the existing discharge is degrading the receiving water.[526] As detailed below, this analysis is flawed for several reasons.

State Board guidance provides that, "[b]aseline quality is defined as the best quality of the receiving water that has existed since 1968 when considering Resolution No. 68-16, or since 1975

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[522] See, e.g., Order No. R5-2010-0099 (City of Galt), p. F-51; Order No. R5-2007-0069 (El Dorado Irrigation District), p. F-55.

[523] Order No. R5-2010-0081 (City of Rio Vista) p. F-56. Neither the findings nor the Fact Sheet suggest that the relatively small magnitude of the Rio Vista discharge was a consideration in this permit determination. Nor does the size of a discharge control whether the policies are triggered.

[524] Larry Walker Associates, Antidegradation Review for Proposed Wastewater Treatment Plant Discharge Modification (Feb. 2005 and May 20, 2009); Expansion ADA. An earlier antidegradation analysis was prepared in 2005. Both analyses examined the impacts of a proposed capacity expansion and are no longer required for the Permit, which does not allow any increase in discharge.

[525] Letter dated June 11, 2010, from Mary Snyder, District Engineer, SRCSD, to Pamela Creedon, Executive Officer, RWQCB re: Request for Change in Permitted Capacity for the Sacramento Wastewater Treatment Plant (SRWTP); see Permit, p. 4. The Permit incorrectly attributes the withdrawal to a pending legal challenge to the District's EIR for its 2020 Master Plan. (Permit, p. F-94.) The reasons for withdrawal of the request for increased permitted capacity are stated in the referenced letter to the Executive Director of the Regional Board from the District Engineer.

[526] Permit, p. F-94. ("[T]he ADA was used by Central Valley Water Board Staff to evaluate the impacts of the discharge at the permitted discharge flow of 181 mgd.")

under the federal policy, *unless subsequent lowering was due to regulatory action consistent with state and federal antidegradation policies*. If poorer water quality was permitted, the most recent water quality resulting from permitted action is the baseline water quality to be considered in any antidegradation analysis."[527] Undeterred by this unambiguous direction, which it has previously followed, and fully aware that the Permit does not allow for an increase in pollutant loading, the Regional Board staff invented a new trigger for antidegradation by calculating the amount of reduced assimilative capacity resulting from the permitted discharge to determine if this "increased" pollutant loading was significant.[528] In other words, the Regional Board established a unique baseline for the Sacramento region, one that has not been applied elsewhere in the state and is contrary to state policy.

Despite the fact that no increase in capacity was being requested or considered, Regional Board staff used information provided in the Expansion ADA to evaluate impacts at the currently permitted discharge flow of 181 mgd.[529] The Regional Board evaluated the District's current loading to determine whether the discharge "degrades" receiving water quality.[530] The baseline for the District and the District alone, which has served millions of people and discharged to the river for decades, was set at a discharge rate of zero—as though the facility and Sacramento region did not exist prior to issuance of this Permit. The Permit improperly characterizes baseline water quality by comparing the District's already-permitted effluent quality to background river concentrations (i.e., mean Sacramento River concentration at monitoring location RSWU-001 upstream of the SRWTP discharge) to calculate the percent of assimilative capacity used. Such an approach is unprecedented and inconsistent with state policies and guidelines. In fact, the Permit's approach treats the Sacramento region differently from every other region and

[527] APU 90-004, p. 4. For examples of other Permits applying the permitted discharge as the baseline, see Order No. R5-2009-0095 (City of Manteca), pp. F-59 to F-61; Order No. R5-2010-0099 (City of Galt), pp. F-51 to F-54.

[528] Permit, p. F-94.

[529] Permit, p. F-94.

[530] Permit, pp. F-93 to F-94.

discharger in the state, where the test has consistently been whether the Permit authorizes any additional degradation above existing conditions.[531]

C. There Is No Evidence the District's Discharge Is Significantly Degrading Receiving Water

Assuming the antidegradation policies apply, the Regional Board erred in applying the Expansion ADA to find that the existing permitted discharge is degrading the receiving water and therefore certain specified levels of treatment are required, and in failing to set forth findings that connect evidence to the conclusions.[532] In concluding that the District's discharge is causing significant degradation, the Regional Board failed to "bridge the analytic gap" between supporting facts and its ultimate decision.[533] Regulatory agencies are required to set forth findings that link their ultimate conclusions to the evidence. This legal requirement reduces "the likelihood that [an] agency will randomly leap from evidence to conclusions" and is critical to ensure participating parties that the decision rendered is reasoned and equitable.[534] As the California Supreme Court has noted, clear articulation of "the relationships between evidence and findings and between findings and ultimate action" discloses the analytic route the administrative agency "traveled from evidence to action." [535] The Legislature "contemplated that the agency would reveal this route."[536]

U.S. EPA has provided guidance for conducting antidegradation reviews for high quality waters (Tier 2) pursuant to federal policy.[537] The King Memorandum discusses significance

[531] See APU 90-004, p. 4.

[532] Information in the Expansion ADA actually supports a finding that the current permitted discharge does not significantly impact water quality in the Sacramento River. The Expansion ADA showed no significant impact to downstream water quality, with the exception of recognition of a need for limitation of oxygen demand in the future. (Larry Walker Associates, Antidegradation Review for Proposed Wastewater Treatment Plant Discharge Modification (Feb. 2005); Expansion ADA.)

[533] See *Topanga, supra,* 11 Cal.3d, pp. 506, 515.

[534] *Topanga, supra*, 11 Cal.3d, p. 516.

[535] *Environmental Protection Information Center v. California Department of Forestry and Fire Protection* (2008) 44 Cal.4th 459, 516.

[536] *Environmental Protection Information Center v. California Dept. of Forestry and Fire Protection, supra,* 44 Cal. 4th, p. 516.

[537] Memorandum from Ephraim S. King, Director, Office of Science and Technology, U.S. EPA, Office of Water, to Water Management Division Directors, Regions 1-10 (Aug. 2005) (King Memorandum).

thresholds for use by states and tribes, measured by use of available receiving water assimilative capacity, that trigger a complete antidegradation analysis including consideration of social and economic impacts. The intent of Tier 2 protection "is to maintain and protect high quality waters and not to allow for any degradation beyond a *de minimis* level without having made a demonstration, with opportunity for public input, that such lowering is necessary and important."[538] A significance threshold of a ten percent reduction in available assimilative capacity is "workable and protective in identifying those significant lowerings of water quality that should receive a full Tier 2 antidegradation review, including public participation."[539] In the Staff Response to Comments, staff dismisses the King Memorandum as non-binding.[540] The point, of course, is not that the memorandum is controlling but that it is relevant and has been consistently followed by the Regional Board since issued. In any event, the Permit fails to explain or document why the ten percent threshold that has been consistently applied in Central Valley Region permits was not applied to the District's permit.[541]

The Permit purports to portray the estimated percent of assimilative capacity of the receiving water used by the District with respect to its current discharge.[542] Approximately $1 billion in new capital costs (and tens of millions in annual operation and maintenance) are associated with treatment to achieve proposed new effluent filtration requirements including total coliform, yet Table F-18 of the Permit does not address coliform or assimilative capacity for

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[538] King Memorandum, p. 1.

[539] See *Ohio Valley Environmental Coalition v. Horinko* (S.D. W.Va. 2003) 279 F.Supp.2d 732, 779 (upholding U.S. EPA's approval of West Virginia antidegradation implementation procedures that include a *de minimis* provision of up to ten percent of the available assimilative capacity for any given pollutant); see also *Kentucky Waterways Alliance v. Johnson* (6th Cir. 2008) 540 F.3d 466, 486 (court found that "[b]ased on these authorities' [referring, in part, to the King Memorandum] . . . I would find that, in order to be considered *de minimis*, . . . a categorical exemption from Tier II review must not permit any individual discharge that would destroy more than ten percent of a Tier II water's available assimilative capacity."). In the Permit, the Regional Board appears to have followed this guidance to a point. Table F-18 of the Permit indicates that the ten percent threshold is exceeded for only three constituents. At most, a Tier 2 analysis *may be* triggered for chlorpyrifos, bromodichloromethane, and ammonia. Even so, this would mean only that findings with respect to socioeconomic impacts must be made to allow the degradation—not that advanced treatment is required.

[540] Staff Response to Comments, pp. 35-36.

[541] The Regional Board has characterized the ten percent threshold as serving "a key objective" of antidegradation review. (Order No. R5-2007-0069, *supra*, p. F-57.)

[542] Permit, pp. F-98 to F-99, Table F-18.

coliform. The information in Table F-18 does not support a finding that the discharge degrades water quality with respect to total coliform or other constituents relevant to filtration requirements.[543] Similarly, the Permit imposes major new capital and operation and maintenance costs for nitrate removal, but Table F-18 shows that the current discharge utilizes zero percent of assimilative capacity for nitrate.[544] Notably, any "degradation" attributable to nitrate would occur only after the District fully nitrifies *in response to* the Permit. The information in Table F-18 does not plausibly provide support for the Regional Board's overly broad generalization regarding "degradation," let alone provide the analysis required to satisfy *Topanga*.

Nor does the Permit fare better in the case of other parameters. With the exception of ammonia, bromodichloromethane, and chlorpyrifos, the Regional Board's analysis shows that the District's current discharge at its current level of treatment utilizes no more than ten percent of assimilative capacity for all other constituents listed.[545] Even the current loadings of bromodichloromethane, and ammonia in the summer months, barely exceed ten percent.[546] For many constituents, the actual use of assimilative capacity is significantly lower than ten percent and typically is below one percent. As pointed out in the District's Expansion ADA, incremental changes of this small magnitude are not measurable for many of these parameters.

Thus, it is clear the ten percent threshold sanctioned by U.S. EPA guidance and consistently applied by the Regional Board would not warrant an antidegradation analysis for the vast majority of constituents. Undaunted, the Regional Board simply abandoned the threshold and instead selected—arbitrarily—ten constituents it deems to have the greatest impact on receiving water quality. The Permit identifies ammonia, salinity (in the forms of EC, TDS, and chloride), copper, cyanide, bis(2-ethylhexyl)phthalate, bromodichloromethane, chloroform, and chlorpyrifos as having the largest impacts on the receiving water.[547] The range of assimilative

[543] Table F-18 identifies no percentage of assimilative capacity used for BOD, and indicates that mean effluent concentration for TSS is less than mean ambient concentrations upstream.

[544] Permit, p. F-98, Table F-18.

[545] Permit, pp. F-98 to F-99, Table F-18; District's October 2010 Comments and Evidence Letter, pp. 61-62.

[546] Permit, p. F-98, Table F-18.

[547] Permit, p. F-94.

capacity for each of the constituents identified varies from 0.6% for chloroform to 44.4% for chlorpyrifos.[548] Thus, the Permit employs an *ad hoc* threshold of *one half of one percent* (0.5%) use of available assimilative capacity in the Sacramento River downstream of the District's discharge as a benchmark to determine that a particular pollutant in the discharge is degrading downstream receiving water quality. A significance threshold of 0.5% is exceptionally low, and is, in fact, not likely measurable in ambient waters.

The use of a 0.5% significance threshold for an existing discharge is not consistent with U.S. EPA guidance or with previous determinations made by the Regional Board. In adopting a permit for Yuba City, the Regional Board relied on APU 90-004 to conclude that a complete antidegradation analysis was not required for the discharges (even though a complete antidegradation analysis was performed by the discharger).[549] The Regional Board also determined that such a finding was consistent with U.S. EPA guidance.[550]

In other permitting actions, the Regional Board incorporated and accepted the ten percent threshold as a measure of significance for determining "substantial lowerings of water quality that should receive a full Tier 2 antidegradation review."[551] In the 2007 permit for the El Dorado Hills wastewater treatment plant, constituents that were considered to significantly increase concentration or mass downstream (i.e., >10% use of assimilative capacity) were subject to an alternatives analysis to determine if the proposed action would be in the best socioeconomic interest of the people of the region, and to the maximum benefit to the people of the state.[552]

The Regional Board has not articulated a technical basis, or legal authority, for establishing a new significance threshold applicable solely to the District's discharge, let alone the District's already-permitted discharge.

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[548] Permit, pp. F-98 to F-99.

[549] Order No. R5-2007-0134-01, *supra*, p. F-72.

[550] Order No. R5-2007-0134-01, *supra*, p. F-72.

[551] Order No. R5-2007-0069, *supra*, p. F-57.

[552] Order No. R5-2007-0069, *supra*, pp. F-57 to F-58.

Finally in this regard, Table F-18 undercuts other portions of the Permit. If, for example, ammonia discharges utilize 2.3-10.3% of the assimilative capacity as shown in the Table, that necessarily means that there is assimilative capacity remaining after the discharge. Thus, there is no basis to conclude that any applicable narrative or numeric water quality standard for ammonia is exceeded in the receiving water as a result of SRCSD's discharge.

D. The Determination of Best Practicable Treatment or Control (BPTC) Is Unsupported by Facts and Contrary to Law and Policy

1. BPTC Is Not Treatment for Treatment's Sake

Assuming the antidegradation policies apply, there are additional reasons they were misapplied here. As noted above, State Board Resolution No. 68-16 applies to waters of the state where the existing quality of water is better than necessary to support existing beneficial uses, and sets forth the circumstances under which change to existing high quality waters will be allowed.[553] The determination as to whether a water body is "high-quality" is pollutant specific.[554] If a water is high-quality for a specified pollutant, any activity which "produces or may produce waste, or increased volume or concentration of waste", will be required to comply with waste discharge requirements that result in BPTC of the discharge.[555] BPTC is the level of treatment necessary to assure that pollution or nuisance will not occur, and that the highest water quality consistent with maximum benefit to people of the state will be maintained.[556]

State Board Resolution No. 68-16 incorporates the federal antidegradation policy.[557] The antidegradation policies do not prohibit changes in water quality.[558] Instead, to the extent that the Regional Board relied on determinations of available assimilative capacity to contend that an

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[553] State Board Order No. WQ 86-8, *supra*, p. 28.

[554] APU 90-004, p. 4.

[555] State Board Resolution No. 68-16.

[556] State Board Resolution No. 68-16. It is worth noting that BPTC is not a basis for establishing WQBELs, which must be developed under applicable federal and state law. The Regional Board is not entitled to leap from a finding of degradation to defining BPTC and then back-calculate the effluent limits.

[556] State Board Resolution No. 68-16.

[557] See State Board Order No. WQ 86-17, *supra*, pp. 17-18.

[558] Attwater Memo re: Federal Antidegradation Policy, p. 10.

antidegradation analysis was warranted, the federal approach to Tier 2 protection would apply.[559] Tier 2 employs a public interest balancing test that weighs impacts on water quality against the need for economic or social development. The greater the impact on water quality, the more robust and compelling the justification must be regarding the need to accommodate economic or social development.[560] As discussed below and elsewhere in this memorandum, the impact to water quality of maintaining the existing permitted discharge is negligible. However, the socioeconomic impact of requiring over $2 billion in new treatment is significant. Thus, the treatment required to comply with the Permit is not "to the maximum benefit" to the region or the State as a whole.

The determination of BPTC must follow an in-depth analysis. What constitutes BPTC for a particular discharge depends on the circumstances of that discharge and several additional factors. A determination of BPTC is guided by the reasonableness standard.[561] "One factor to be considered in determining best practicable treatment or control would be the water quality achieved by other similarly situated dischargers and the methods used to achieve that water quality. Information concerning alternatives and costs of alternatives is relevant to determining compliance with Resolution 68-16."[562] "While the Regional Water Board may not specify the manner of compliance with waste discharge requirements, however, it must consider 'best practicable treatment or control' of the discharge. The Regional Water Board should require the [discharger] to consider additional methods that will control the discharge, including methods

[559] The federal policy sets forth three tiers for protection: Tier 1, which requires protection of existing instream water uses and is intended to serve as a baseline to ensure that existing uses be maintained; Tier 2, which requires that where water quality exceeds levels necessary to support beneficial uses (i.e., is better than necessary), water quality shall be maintained and protected unless allowing lower water quality is necessary to accommodate important economic or social development in the area where the waters are located; and, Tier 3, which applies to outstanding national resource waters (ONRW). (40 C.F.R. § 131.12(a).) Although the Delta is an important water body, it is not a designated ONRW and therefore Tier 3 does not apply.

[560] Attwater Memo re: Federal Antidegradation Policy, p. 12.

[561] State Board Order No. WQ 86-8, *supra*, p. 29.

[562] *In the Matter of the Petition of San Luis Obispo Golf and Country Club*, State Board Order WQ 2000-07 (April 26, 2000), pp. 10-11.

used by other similarly situated dischargers, in determining the appropriate effluent limitations."[563]

The law does not require "treatment for treatment's sake."[564] Practicability is more than a matter of engineering feasibility or whether something *can* be done. The question is whether, on balance, the water quality benefit to be achieved warrants the costs of the application of the technology, including increased energy demands and other impacts.

Here, the Regional Board concluded that BPTC for the District's discharge includes implementation of nitrification, denitrification, and the equivalent of Title 22 tertiary filtration with ultraviolet light or chlorine disinfection treatment.[565] The Permit includes statements regarding conditions in the Delta and restates the conclusion that the Permit requires BPTC. Nowhere in the Permit does the Regional Board cite the evidence supporting this conclusory finding nor set forth a meaningful analysis as to why, based on the evidence, these particular requirements and not others constitute BPTC. There is no meaningful effort to determine whether these requirements are reasonable, or, whether they are necessary to assure that pollution or nuisance will not occur. Further, there is no evidence to establish the existence of a benefit of consequence.[566]

Before delineating BPTC, the Regional Board must first conduct a complete antidegradation analysis considering both Resolution No. 68-16 and the federal antidegradation policy. APU 90-004 provides guidance regarding when an antidegradation analysis is required,

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[563] State Board Order No. WQ 2000-07, *supra*, p. 12. While BPTC is not expressly defined, guidance can be found in the CWA provisions related to development of effluent limitations requiring application of "the best practicable control technology currently available as defined by the Administrator." (33 U.S.C. § 1311(b)(1)(A).) "Best practicable control technology currently available" is determined based on several factors, including, "the total cost of application of technology in relation to the effluent reduction benefits to be achieved from such application, and shall also take into account the age of equipment and facilities involved, the process employed, the engineering aspects of the application of various types of control techniques, process changes, non-water quality environmental impact (including energy requirements), and other factors as the Administrator deems appropriate." (33 U.S.C. § 1314(b)(1)(B).) An analysis of these factors may assist in determining BPTC for a particular case.

[564] Senate Comm. on Environment and Public Works, 95th Cong., 2d Sess., Legislative History of the Clean Water Act of 1977, at 343 (Comm. Print 1978); see also *Natural Resources Defense Council v. U.S. EPA*, 656 F.2d 768, 773 (D.C. Cir. 1981) (in enacting the CWA, Congress expressed a desire to avoid "treatment for treatment's sake").

[565] Permit, pp. F-96, J-12.

[566] See sections V-VII, *supra*, concerning filtration, nitrification, denitrification.

what the analysis entails, and how the review should be completed. The following steps are required:

1. Compare receiving water quality to the water quality objectives established to protect designated beneficial uses.

2. Balancing the proposed action against the public interest.

3. Report on the antidegradation analysis.

Unlike other recent permits issued by the Regional Board, the Permit does not include or reference an appropriate complete antidegradation analysis to support its BPTC conclusions.[567] Initially, it deserves emphasis that the entire "analysis" consists of a paragraph on the bottom of page F-96, various bullet points, a Table F-18 which is of almost no value (as discussed below), and two argumentative paragraphs added after the public comment period. This is far, far from the rigor that is necessary to support such dramatic outcomes.

The Permit includes at best a beginning of the analysis required under Step One of the guidance. Table F-18 does include a comparison of some effluent data and downstream receiving water quality below the District's discharge to the applicable water quality objectives.[568] Importantly, however, it *does not perform step 1 at all* for nitrate, total coliform, or other filtration-related requirements. Moreover, the Regional Board, as discussed above, employed an entirely novel way of viewing that information rather than applying thresholds of significance consistent with recent antidegradation reviews for other dischargers. The Regional Board then left the task unfinished, omitting the second and third steps. The Regional Board did not undertake the balancing of the proposed action against the public interest as required in Step Two. Nor did the Regional Board set forth the required report, which is to include specific components and is designed to provide the transparency necessary to "ensure full intergovernmental

[567] The Regional Board could not rely on the District's 2009 Expansion ADA for an analysis of the socioeconomic impacts of the Permit. The 2009 report evaluated only the impacts of advanced treatment of the SWRTP effluent to remove the increment of mass loading that would result from a proposed increase in discharge capacity from 181 mgd to 218 mgd. The District's Expansion ADA did not evaluate the socioeconomic impacts of full nitrification, full denitrification, and the equivalent of Title 22 filtration with ultraviolet light or chlorine disinfection for the existing discharge.

[568] Permit, pp. F-98 to F-99.

coordination and public participation in the permitting process."[569] All three steps are necessary to ensure compliance with the state and federal antidegradation policies (i.e., is the action to the maximum benefit of the public, and necessary to accommodate important economic or social development in the area?). Had such an analysis been properly performed, the conclusions in the Permit with respect to BPTC would be entirely different. The Regional Board's analysis is fundamentally deficient, and would not have been accepted had it been submitted by a regulated entity.

2. Bullet Points Are Not Analysis

In support of the assertion that the identified levels of treatment constitute BPTC, the Permit sets forth a series of bulleted summary statements.[570] These bullet points are statements of fact of varying relevance which, even if true, do not support the Regional Board's conclusions and "soundbite" argumentative conclusions. These purported "findings" fail to satisfy the rigor specified in APU 90-004, which states that the antidegradation analysis should be summarized in the fact sheet and include all of the following: water quality parameters and beneficial uses which will be affected by the proposed action and the extent of the impact; scientific rationale for determining the proposed action will or will not lower water quality; description of the alternative measures that were considered; a description of socioeconomic evaluation; and the rationale for determining that the proposed action is or is not justified by socioeconomic considerations.[571]

The first four statements in the list of bullet points are statements of fact.[572] The District does not dispute the importance of the Sacramento River and the Sacramento-San Joaquin Delta, or the fact that the Delta is an important environmental and economic resource for the state. These four statements do not provide any evidence to suggest that the District's existing discharge is negatively affecting these beneficial uses, or that the proposed treatment

[569] APU 90-004, p. 6.

[570] Permit, pp. F-94 to F-96.

[571] APU 90-004, p. 6.

[572] See Permit, pp. F-94 to F-95.

requirements in the Permit are reasonable. These are merely statements of fact, and are a far cry from the analysis required by law.

The bullet statement that "[a]mmonia, along with BOD, from the SRWTP reduces the dissolved oxygen in the Sacramento River and Sacramento-San Joaquin Delta for nearly 40 miles below its discharge" does not lead to the conclusion that full nitrification is necessary to ensure compliance with dissolved oxygen water quality objectives.[573] To the extent that discharges from the SRWTP reduce dissolved oxygen in certain areas downstream of the SRWTP discharge, the Regional Board could have imposed an appropriate limit on oxygen demand that would ensure future compliance with dissolved oxygen water quality objectives under all projected critical river flow and temperature conditions. To comply with such a limit, the District would have to decrease the levels of ammonia and/or BOD in its discharge. However, full nitrification of effluent from SRWTP is not necessary to meet water quality objectives for dissolved oxygen.[574]

The bullet statement that "[t]he oxygen depleting constituents from the SRWTP use or will use all the assimilative capacity of the River and Delta leaving no assimilative capacity available to other communities that currently reduce oxygen demanding constituents by implementing advanced treatment processes," is simply not relevant to the Permit and is highly misleading.[575] The District is not requesting or proposing an increase in discharge, and therefore it does not seek to use additional assimilative capacity beyond what has been permitted previously. The District agrees that a limit on oxygen demand from the SRWTP is appropriate to ensure applicable dissolved oxygen water quality objectives are met. A permit that did not require full nitrification would not consume assimilative capacity otherwise available. With regard to those facilities that discharge effluent to receiving waters either within or tributary to the Delta downstream of Rio Vista (i.e., Stockton, Galt, Tracy, Manteca, Lodi, El Dorado Hills, and

[573] Permit, p. F-95.

[574] District's Low Dissolved Oxygen Prevention Assessment (LDOPA 2010); see section VI, *ante*.

[575] Permit, p. F-95. The issue of assimilative capacity is also discussed in Attachment J of the Permit. The Regional Board's assertions with regard to how other dischargers would be affected by the lack of assimilative capacity for oxygen demanding constituents was refuted in the District's comments. (District's October 2010 Comments and Evidence Letter, pp. 42-43.)

Ironhouse), the District's far field modeling shows that SRWTP effluent comprises 0.82 - 3.53% (99.91 percentile at a discharge rate of181 mgd) of any given volume of water at various locations in the Delta. It is inconceivable that a hypothetical 2% of SRWTP effluent in a volume of water at some location in the Delta would exert such a demand on dissolved oxygen that there would be no assimilative capacity in the receiving water for additional oxygen demanding substances contributed by another discharger.[576] Further, other municipalities have not previously been regulated based on dissolved oxygen in the Sacramento River downstream of the SRWTP and it is highly unlikely that would occur, in part because their oxygen demand is asserted upstream.

With regard to ammonia, the Permit bullets assert: "The ammonia from the SRWTP contributes to the water quality problems in the Suisun Bay"; "The ammonia from the SRWTP is acutely and chronically toxic to species, including copepods and freshwater mussels that reside in the Sacramento River and Sacramento-San Joaquin Delta"[577]; and, "Ammonia in the SRWTP effluent combined with chlorine disinfection creates nitrosamines at levels 100 times greater than the primary MCL. Nitrosamines are highly mutagenic and potentially carcinogenic."[578] Even if all of these statements were unambiguously true, the Regional Board has the authority—and the obligation—to adopt WQBELs to implement applicable numeric or narrative water quality objectives to address each of these issues. But single-minded advocacy for *pre-ordained treatment outcomes* is not appropriate. In the meantime, of course, the conclusions are overly simplistic, misleading, and incorrect. The District addresses these ammonia-related issues in detail in section VI above.

The Permit bullets also include a statement regarding risk of pathogenic illness that allegedly occurs "at times."[579] The precise basis for the statement is uncertain, but the issue of pathogens and health risks *is fully* addressed in section V above. The discharge causes no

[576] District's October 2010 Comments and Evidence Letter, p. 43.

[577] In the September Tentative Permit, these alleged toxic effects were characterized as possible ("ammonia from the SRWTP may be acutely or chronically toxic"). The sentence was revised to an affirmative statement that the effluent is toxic without any corresponding reference to new data or information that led to a different conclusion. (November Redline Tentative Permit, p. F-94.)

[578] Permit, p. F-95.

[579] Permit, p. F-95.

meaningful increase in risk and recreational users are clearly protected at the current level of disinfection. The Permit bullets also state that filtration will reduce levels of certain pollutants.[580] While this may be factually correct to some degree with regard to some of the pollutants listed, the statement is beside the point. Filtration was not proposed based on incidental removals of constituents such as copper, but on alleged protection of the recreation use. Nor has any antidegradation analysis at all been provided for the other constituents such as BOD or TSS. Thus, this bullet point provides no support for establishing filtration as BPTC.

The bullet points also include the sweeping statement that "[r]eduction or elimination of ammonia, nitrate and protozoans will reduce impacts to the beneficial uses of the Sacramento River and Sacramento-San Joaquin Delta from the SRWTP discharge." The Permit provides no evidence that, in fact, advanced treatment of the SRWTP discharge provides tangible or definite benefits or otherwise leads to improved attainment of beneficial uses. As discussed in section V above, the facts indicate that there is no discernible benefit in the highly costly filtration requirements, and they are not reasonable. With regard to a determination of BPTC, in consideration of the dilution provided in the receiving water, the *de minimis* nature of risk posed by the current discharge, and the costs (economic, environmental, and otherwise), the current level of treatment at the SRWTP provides BPTC.

The last two bullets in the Permit are apparently designed to bolster the conclusion that the treatment requirements proposed are the same as those of other similarly situated dischargers.[581] As discussed below, the information presented does not represent a comparison to "other similarly situated dischargers," and therefore the statements are without support.

The Regional Board concluded that an antidegradation analysis was required for the District's existing discharge due to changes in downstream conditions.[582] Even assuming the analysis was required, the Regional Board had an obligation to conduct the analysis required

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[580] Permit, p. F-95.

[581] Permit, p. F-96; see State Board Order WQ 2000-07, *supra*, pp. 10-11 ("One factor to be considered in determining best practicable treatment or control would be the water quality achieved by other similarly situated dischargers and the methods used to achieve that water quality.").

[582] Permit, p. F-93.

under state and federal policy and guidance. The page of bullet points set forth as findings falls far short of the requirement that the Regional Board articulate "[t]he scientific *rationale* for determining that the proposed action will or will not lower water quality" and the "*rationale* for determining that the proposed action is or is not justified by socioeconomic considerations."[583]

3. The Regional Board Did Not Conduct the Required Balancing of Socioeconomic Impacts and Water Quality Benefits

When determining if an increased load of a pollutant to a high quality water should be allowed, the Regional Board must determine if the discharge is necessary to accommodate social or economic development and is consistent with maximum public benefit.[584] In making such a determination, State Board guidance specifies several factors to be considered, including "[e]conomic and social costs, tangible and intangible, of the proposed discharge compared to benefits."[585] The economic impacts to be considered include those affecting such parameters as housing, employment, and income.[586] These impacts are weighed against the benefits to be obtained by requiring the expenditures.

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[583] APU 90-004, p. 6, emphasis added.

[584] Where the federal antidegradation policy applies, Resolution No. 68-16 incorporates the tests from the federal antidegradation policy to determine if changes in water quality are consistent with the maximum benefit to the people of the state. (State Board Order No. WQ 86-17, *supra*, p. 17.)

[585] APU 90-004, p. 5. The factors are:

> a. Past, present, and probable beneficial uses of water.
>
> b. Economic and social costs, tangible and intangible, of the proposed discharge compared to benefits. The economic impacts to be considered are those incurred in order to maintain existing water quality. The financial impact analysis should focus on the ability of the facility to pay for the necessary treatment. The ability to pay depends on the facility's source of funds. In addition to demonstrating a financial impact on the publicly- or privately-owned facility, the analysis must show a significant adverse impact on the community. The long-term and short-term socioeconomic impacts of maintaining existing water quality must be considered. Examples of social and economic parameters that could be affected are employment, housing, community services, income, tax revenues, and land value. To accurately assess the impact of the proposed project, the projected baseline socioeconomic profile of the affected community without the project should be compared to the projected profile with the project.
>
> c. The environmental aspects of the proposed discharge must be evaluated. The proposed discharge—while actually causing reduction in water quality in the given water body—may be simultaneously causing an increase in water quality in a more sensitive body of water from which the discharge in question is being diverted; e.g., changing the location of San Francisco's outfall from the Bay to the ocean.
>
> d. The implementation of feasible alternative control measures which might reduce, eliminate, or compensate for negative impacts of the proposed action. (APU 90-004, p. 5.)

[586] APU 90-004, p. 5.

Here, no increased load of pollutants was permitted. To the extent that the Regional Board nonetheless judged an antidegradation analysis to be proper, the Regional Board must determine whether the cost (and impacts to the region) of full nitrification, full denitrification, and equivalent of Title 22 filtration are outweighed by the benefits to be realized and thus constitute BPTC for the discharge. Specifically, the Regional Board must find that the proposed requirements do not unduly impact social and economic development and are to the maximum benefit to the people of the state.

a. The Regional Board's Consideration of Socioeconomic Impacts Was Superficial and Deficient

In conducting an antidegradation review, the Regional Board is to consider "[e]conomic and social costs, tangible and intangible, of the proposed discharge compared to benefits."[587] The State Board has provided guidance, in other contexts, as to what is required to meaningfully consider economics.[588] A regional board should review currently available information and "consider, and respond on the record, to any information provided by dischargers or other interested persons regarding the potential cost implications . . . ."[589] The information necessary to conduct the requisite comparison of costs and benefits for antidegradation review was available to the Regional Board at the time the Permit was adopted. A technical memorandum, *Analysis of Costs and Benefits of Advanced Treatment Alternatives for the Sacramento Regional Wastewater Treatment Plant* (Cost/Benefits Analysis), was submitted to the Regional Board in May 2010. This analysis evaluated the cost of implementing five advanced treatment trains and the changes in downstream water quality that these treatment trains could achieve. The report evaluated full nitrification, full denitrification, filtration, and UV disinfection, as well as reverse osmosis, ozone/peroxide oxidation, and combinations of these various treatment processes, and concluded

[587] APU 90-004, p. 5.

[588] Attwater Memorandum, p.5.

[589] Attwater Memorandum, p. 5. While this guidance was focused on the analysis to support water quality objectives, the Regional Board has applied a similar process in analyzing economics related to other decisions, including total maximum daily load development. (See Memorandum from Sheila K. Vassey to Stefan Lorenzato, October 27, 1999.)

that the high costs associated with the implementation of advanced treatment of SRWTP secondary treated effluent discharged at the once proposed rate of 218 mgd are disproportionate to the water quality benefits that may be observed in downstream receiving waters with implementation of advanced treatment.[590] The report found that the change in downstream water quality that would be realized from implementation of advanced treatment at SRWTP was not commensurate with the cost of advanced treatment even at the higher discharge volume.[591] Given the minor, and in some cases immeasurable reductions in downstream receiving water constituent concentrations that would result from the advanced treatment train alternatives, the high capital and total annual costs of implementation of advanced treatment were found to be disproportionate.

In addition, a study prepared by the University of the Pacific (UOP) evaluated the socioeconomic impacts of implementing nutrient removal for a SRWTP discharge rate of 181 mgd, and found that nutrient removal of the SRWTP discharge is estimated to lead to an annual income loss of $94.4 million and an annual employment loss of 390 jobs in the District's service area, which covers most of Sacramento County.[592] While the Permit makes passing reference to studies having been "considered," the Permit does not describe the findings of these studies and state why they are, or are not, relevant or accurate.[593] There was also substantial

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[590] Cost/Benefits Analysis, p. 5-2. As noted, the District withdrew its request to increase the SRWTP capacity from 181 mgd to 218 mgd. The increment of pollution reduction due to implementation of advanced treatment of a 181 mgd discharge would be even smaller than the increment in pollution reduction modeled for a 218 mgd discharge.

[591] Cost/Benefits Analysis, p. XII.

[592] Michael, Dr. Jeffrey, Pogue, Dr. Thomas, Business Forecasting Data, Eberhardt School of Business UOP, Advanced Wastewater Treatment for Nutrient Reduction: Impact on Sacramento Income and Employment (Aug. 23, 2010) (UOP Study), p. 8. The UOP Study that is in the record (see Hearing Transcript p. 253:7-16 [second UOP Study was released after public comment period]) is limited to the impacts of nutrient removal, which is considered to consist of NTF, FBR, and two new pumping stations for a flow rate of 181 mgd. The UOP Study does not include an assessment of impacts associated with costs for Title 22 or equivalent filtration with ultraviolet light or chlorine disinfection treatment. The Staff Report seizes on UOP's estimate of the loss of jobs from curtailment of water experts and closure of the salmon fishery in 2008 and 2009 as somehow relevant "if the District were to receive a permit that provided less stringent requirements." (Staff Report, p. 39.) These job losses are not attributed to SRCSD's discharge, and therefore do not support the staff's premise. The Regional Board made no attempt to establish, let alone estimate, a relative alleged contribution of SRCSD's discharge to the overall decline of the fisheries.

[593] Various other parties, and the Regional Board's own consultants also identified significant costs associated with nitrification, denitrification, and filtration. The Permit does not disclose which of these estimates the Regional Board

testimony by others of the significant economic impacts to the region. The North State Building Industry Association submitted a report detailing the drastic impact of the increased connection fees on development in the region.[594] Campbell's Soup and other area businesses provided compelling testimony regarding the effects of increased sewer rates on their ability to remain in business, and residents addressed the personal hardship that the unprecedented rate increases would have on their families.[595]

The Permit does not make any specific findings about the expected cost of compliance. The Regional Board did not refute the District's analyses, nor identify countervailing considerations, but simply concluded that even a $2 billion cost is reasonable because: (1) other dischargers have incurred significant costs; and (2) "failure to implement tertiary filtration, nitrification, and denitrification *may result or will likely result* in an adverse impact to the REC-1, municipal and domestic water supply, aquatic life, and agricultural beneficial uses."[596] These possible adverse impacts are purely speculative, and are not supported in the Permit. Clearly, the Regional Board was not to be deterred from its course of requiring particular treatment without regard to either the magnitude of the costs or theoretical nature of the presumed benefits.

b. The Cost Information Related to Other Dischargers Is Biased, Suspect, and Misleading

The sum of the Regional Board's inquiry into the reasonableness of the costs of implementing the Permit is set forth in Table F-17 of the Permit, which is titled "Per Capita Costs of Tertiary Upgrades." The information in Table F-17 is presented without reference to its source

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relied upon or why it considered one evaluation to be more relevant than another. (See Memorandum dated August 13, 2010, to Kathleen Harder, Regional Board, from PG Environmental, LLC, Subject: Technical Review of Estimated Costs for Proposed Changes to the Sacramento Regional Wastewater Treatment Plant; Memorandum dated August 18, 2010, to Kathleen Harder, Regional Board, from PG Environmental, LLC, Subject: Technical Review of Estimated Costs for Proposed Changes to the Sacramento Regional Wastewater Treatment Plant; Technical Memorandum, Trussell Technologies, Ammonia Removal Cost Alternatives for the Sacramento Regional Wastewater Treatment Plant (May 31, 2010); Trussell October 1 Letter; see section IV above regarding Cost Considerations.)

[594] Economic Planning Systems, Inc., Sacramento County Regional Sanitation District Potential Fee Increase Analysis (October 8, 2010); Hearing Transcript, pp. 333:7-335:8.

[595] See, e.g., Hearing Transcript, pp. 1:25, 342:20-344:4; see also the numerous comment letters from residents of the region in the record.

[596] Permit, p. F-97, emphasis added.

or citation to evidence in the record. First, the Permit states in a footnote that the Table is based on a "telephone survey."[597] There *was no* formal survey conducted. Rather, Regional Board staff selected and called certain specific municipal dischargers for information.[598] Regional Board staff did not speak to representatives of each of the entities listed, and in some instances staff provided the information in Table F-17 for a discharger without even having spoken to anyone affiliated with the discharger at all. There is no indication, anywhere, of what questions were asked, what the specific answers were, why these individual entities were chosen for "surveying," or why they might be "similarly situated" to the District. Further, assuming that the goal of the so-called "survey" was in some way to gather information regarding the costs of compliance with post-secondary treatment, an objective survey that included a truly representative sample would have revealed the answer to be *zero* for many municipal dischargers who are permitted to discharge secondary effluent. The purported survey identifies a "per capita" cost that is not based on appropriate information, such as costs that have actually been incurred, financing methods, allocation among existing, new, and industrial users, or other factors that would affect the actual costs to residents, or the actual impacts in the specific community under consideration.

Still further, a notable change occurred in Table F-17 after the September Tentative Permit. The title of Table F-17 (which was formerly F-18 in the September Tentative Permit) is "Per Capita Costs for Tertiary Upgrades." But the heading *within* Table F-17 itself was *changed,* from "Tertiary Conversion Cost" to "Upgrade and Expansion Costs."[599] The District submits that "upgrade and expansion" means something quite different than "tertiary conversion." For example, the District's estimated costs do not include expansion.

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[597] Permit, p. F-96.

[598] The September Tentative Permit contained a version of the same table. (September Tentative Permit, p. F-93.) Subsequent to the issuance of the September Tentative Permit, District representatives visited the Regional Board on September 21, 2010, to, among other things, acquire the survey or information regarding the survey. As of September 21, 2010, the only information available in any way related to the survey was an electronic mail response from Larry Parlin with the City of Stockton and an Excel file that replicated Table F-17. (District's October 2010 Comments and Evidence Letter, p. 74.) Subsequently, Regional Board staff, other than the person identified as the surveyor, prepared a memorandum for the file dated September 29, 2010, nearly four weeks after release of the September Tentative Permit. The memorandum to file merely states that a telephone survey was conducted in July of 2010. It does not include or identify the questions asked to the various contacts from the other POTWs, or document the responses given. (Memorandum to File dated September 29, 2010, from Kathleen Cole Harder, Regional Board.)

[599] See November Redline Tentative Permit, p. F-96; Permit, p. F-96.

Several of the entities represented in Table F-17 disagreed with the inclusion of the information in the Permit in written comments that are part of the Permit record.[600] The City of Roseville's representative, Art O'Brien, stated that the information in Table F-17 did not accurately reflect his conversation with Regional Board staff and that it was not possible to isolate tertiary treatment costs from other improvements.[601] He also made clear that tertiary treatment was required as a result of a master plan EIR and, at Roseville's Deer Creek plant, the upgrade was associated with an expansion in discharge volume.[602] Mr. O'Brien requested that Table F-17 be deleted or, at a minimum, the references to the City of Roseville be removed.

Similarly, the City of Vacaville noted that the $150 million in costs identified for Vacaville includes all plant upgrades, such as construction of storage to eliminate bypass and demolition of outdated facilities.[603] Vacaville's letter also emphasized that far from considering these costs to be reasonable, Vacaville views them as an extraordinary expenditure for improvements that will yield "minimal Delta water quality benefit."[604] As for Ironhouse Sanitary District (ISD), which was issued a permit for a new discharge to the Delta, their letter makes clear that:

> In ISD's case, the $54.5 million is the total cost of constructing an entirely new treatment facility along with major influent and effluent piping and new river outfall to meet all permit requirements for a new surface water discharge—not an incremental cost for upgrading an existing secondary treatment facility to tertiary. There is concern that listing this cost figure in a column headed "tertiary conversion costs" is misleading and may result in "apples to oranges" comparisons.[605]

It is clear that even the selective, perfunctory analysis conducted by the Regional Board is unreliable and cannot be deemed to constitute a socioeconomic analysis as required under the

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[600] Though four entities requested that Table F-17 be deleted, or at a minimum, the information relating to their facilities be deleted, only the City of Davis was removed from Table F-17 in the final Permit. (November Redline Tentative Permit, p. F-96.)

[601] Letter dated September 22, 2010, to Kathy Harder, Regional Board, from Art O'Brien, City of Roseville.

[602] Letter dated September 22, 2010, to Kathy Harder, Regional Board, from Art O'Brien, City of Roseville.

[603] Letter dated October 8, 2010, to Kathleen Harder, Regional Board, from David K. Tompkins, City of Vacaville.

[604] Letter dated October 8, 2010, to Kathleen Harder, Regional Board, from David K. Tompkins, City of Vacaville.

[605] Letter dated October 5, 2010, to Kathleen Harder, Regional Board, from Jennifer Skrel, Ironhouse Sanitary District.

antidegradation policies.[606] Thus, the Regional Board should not have relied on this information to determine BPTC for the District's discharge.

c. The District's Situation Is Not Similar to Other Dischargers Cited in the Permit

Among the factors to be considered in determining BPTC for a particular discharge are "methods used by other similarly situated dischargers."[607] As noted above, the socioeconomic component of Regional Board's BPTC analysis consists of merely a table comparing the per capita costs of implementing the Regional Board's desired treatment train to those of other allegedly similarly situated communities.[608] Following the table, the Permit states that economic and socioeconomic studies provided by the District and other parties were considered and concludes that even if the cost to implement the Permit is $2 billion, the resulting monthly sewer service charge of $60 is reasonable because:

> (1) many communities discharging to surface waters pay substantially more for sewer service; and (2) the increased sewage treatment rate of $60 per month may be overestimated given that other large communities in the Sacramento/ Delta area that [sic] have already upgraded their treatment facilities to advanced treatment also similar to that proposed in these waste discharge requirements have sewer fees substantially less than the monthly fees projected by the Sacramento Regional County Sanitation District, including the Cities of Stockton, Roseville, Tracy, and Lodi.[609]

This "analysis" is not only overly simplistic, but fatally flawed on multiple levels. First of all, these dischargers are not all similarly situated to the District. The District's "situation" is as follows: it discharges treated effluent from a multiport diffuser lying on the bottom of the largest river in California. The Sacramento River flow provides very considerable dilution of the effluent in the immediate receiving water. In such situations, the Regional Board has not required filtration, as described in section V. In addition, the Regional Board typically grants mixing

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[606] The superficiality of these comparisons was demonstrated by District Engineer Stan Dean during his hearing testimony. (Hearing Transcript, pp. 224:4-225:7; see also section IV of this Statement of Points and Authorities.)

[607] State Board Order No. WQ 2000-07, *supra*, p. 12.

[608] Permit, p. F-96.

[609] Permit, p. F-97.

zones.[610] None of the named entities discharges directly to the Sacramento River. The cities of Manteca and Stockton discharge to the San Joaquin River, which has very different ambient water quality, flows, and other characteristics.[611] Most of the examples provided are POTWs that discharge to effluent dominated waterways (small creeks and sloughs) where dilution does not occur during critical low flow periods (e.g., Roseville, Lodi, Woodland, and Vacaville).[612] Absent the end-of-pipe effluent limitations, which drive the high treatment costs, these entities would have been considered to use more than 100% of the assimilative capacity of their immediate receiving waters for various relevant pollutants, a situation vastly different than that of the District.[613] ISD discharges seasonally to the San Joaquin River in the western Delta, and applies recycled water in the summer months to adjacent agricultural lands.[614] For its discharge to the San Joaquin River, ISD is considered a "new discharger."[615] It elected to propose treatment beyond secondary treatment for its "new" discharge to the Delta, approved in 2008.[616]

In comparison, the cities of Yuba City, Corning, and Chico all discharge to mainstem rivers tributary to the Delta where significant dilution is available.[617] For these cities, the Regional Board has adopted effluent limits that are consistent with secondary treatment standards and do not require implementation of filtration, nitrification, or denitrification.[618] Further, the Regional Board has found that compliance with these secondary treatment requirements will result in "the use of best practicable treatment or control of the discharge."[619] Given the concerns

[610] See sections VI and VII, *supra*, IX, *post*; and District's October 2010 Comments and Evidence Letter, pp. 78-88.

[611] See District's October 2010 Comments and Evidence Letter, p. 74.

[612] See District's October 2010 Comments and Evidence Letter, p. 74.

[613] See District's October 2010 Comments and Evidence Letter, p. 74.

[614] See District's October 2010 Comments and Evidence Letter, p. 75.

[615] See District's October 2010 Comments and Evidence Letter, p. 75.

[616] See District's October 2010 Comments and Evidence Letter, p. 75.

[617] See District's October 2010 Comments and Evidence Letter, p. 75.

[618] See Order No. R5-2010-0080 (City of Corning), p. 11; see also Order No. R5-2010-0019 (City of Chico), p. 11; see also Order No. R5-2007-0134-01, *supra* (Yuba City), p. 11.

[619] Order No. R5-2010-0019, p. F-39; Order No. R5-2007-0134-01, p. F-78; see also Order No. R5-2010-0080, pp. 8-9 (where the Regional Board finds that the discharge is consistent with Resolution No. 68-16 and the federal antidegradation policy). While Order No. R5-2010-0080 includes a reference to further discussion in the Fact Sheet, this discussion is absent from the adopted permit.

expressed in the Permit for ecosystem effects in Suisun Bay and recreational impacts in the near field, deep water dischargers to San Francisco Bay (including Central Contra Costa Sanitary District, Delta Diablo Sanitation District, East Bay Dischargers Authority, East Bay Municipal Utility District, and the City and County of San Francisco) *are* similarly situated to the SRWTP. These large municipal facilities are all permitted by the San Francisco Bay Regional Water Quality Control Board to discharge secondary effluent to the Bay or Delta *without nitrification.*[620]

A theme of the Permit and related documents is that other "large" dischargers in the "Delta" have been required to implement advanced treatment, so the District should too.[621] This is overwhelmingly simplistic and misleading. Other dischargers in the Delta have been issued WQBELs based on the effects of the discharge on immediate receiving waters and consideration of applicable policies. This practice is applicable throughout the Central Valley region and should apply to the District.

Moreover, the Regional Board is by its own admission regulating the District differently from the communities it has identified as comparable. In the District's Permit, the Regional Board applied a different approach to antidegradation, the granting (or denial) of dilution credits, and the application of water quality standards for ammonia, nitrate, and pathogens.

The "Delta" as referenced by the Regional Board is presumably the triangle drawn by the legislature in Water Code section 12220. It is as arbitrary to base effluent limitations on location within this triangle as it would be to have limitations based on the boundaries of San Joaquin County (which also encompass Lodi, Stockton, Manteca, and Tracy). Indeed, very little of the District is in the Delta and SRCSD could theoretically move its diffuser somewhat, such that the diffuser would not be located in "the Delta." If this occurred, should this affect the requirements properly imposed on the District? Obviously not. Nor should the District's location at the top of the "Delta" triangle serve to justify requirements not otherwise justified.

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[620] Order No. R2-2007-008 (Central Contra Costa Sanitary District); Order No. R2-2009-0018 (Delta Diablo Sanitation District); Order No R2-2006-0053 (East Bay Dischargers Authority); Order No. R2-2010-0060 (East Bay Municipal Utilities District, Special Dist. No. 1); Order No. R2-2008-0007 (City and County of San Francisco).

[621] Permit, p. F-97; Staff Response to Comments, p. 44.

As discussed previously, the Regional Board required filtration for Lodi, Stockton, Manteca, and Tracy as a result of application of the 20:1 policy, finding insufficient dilution.[622] Similarly, these municipalities' WQBELs requiring nitrification and denitrification (other than Stockton, which has no denitrification requirement) are driven by the conditions of discharge to the immediate receiving water. Consistent application of these policies and reasoning to this Permit would not result in a requirement for advanced treatment.

The Regional Board based the ammonia effluent limitations in the recently issued permits for Manteca, Lodi, Tracy, and Stockton on the U.S. EPA's National Ambient Water Quality Criteria (NAWQC) for the protection of aquatic life when salmonids and early life stages are present.[623] None of these dischargers were subject to effluent limitations based on "recent studies," anticipated but not yet published U.S. EPA criteria revisions, the speculation that their discharges *may have* effects on diatoms, or other hypotheses.[624]

With regard to dilution, the Manteca discharge occurs through a 36-inch diameter pipe located on a side bank, which the Regional Board found provides minimal dilution.[625] The discharge is to a tidally influenced section of the San Joaquin River, which experiences flow reversals and prolonged near-slack water conditions under low flow conditions.[626] In addition, the modeling and field studies for acute and chronic aquatic criteria demonstrated that there is limited dilution within the immediate vicinity of the outfall (acute) and 4,100 feet north of the outfall (chronic).[627] In the absence of additional information, the Regional Board determined that it was not appropriate to allow a mixing zone nor grant dilution credits for acute aquatic criteria.[628]

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[622] See section V, *supra*.

[623] Manteca Permit, pp. F-40 to F-42; Lodi Permit, pp. F-23 to F-24; Tracy Permit, pp. F-30 to F-31; Stockton Permit, pp. F-26, F-27.

[624] Permit, pp. J-5 to J-7.

[625] Manteca Permit, p. F-31.

[626] Manteca Permit, p. F-31.

[627] Manteca Permit, pp. F-31 to F-32.

[628] Manteca Permit, pp. F-31 to F-32.

The Lodi Permit denies dilution credits in part because the receiving water is a tidally influenced dead end slough, a quiescent water body with minimal dilution within the vicinity of the discharge.[629] The Lodi Permit denies dilution credits because Lodi did not provide sufficient information for the Regional Board to determine a mixing zone that will not adversely impact beneficial uses.[630] Similarly, Tracy was denied dilution due to insufficient data to provide design flow for evaluating dilution for the acute and chronic aquatic life criteria; the tidal cycle, slack tide, and critical dry years, which can result in no flow being available for dilution; the receiving water being limited in size; multiple dosing of effluent into the receiving water; and the receiving water being identified as a "Toxic Hot Spot" under the Bay Protection and Toxic Hot Spot Cleanup Program.[631] These situations are manifestly different from the District's, in terms of both the physical discharge using a diffuser at the bottom of the river and the receiving water into which the effluent is discharged.

With regard to Stockton, the Regional Board found that tidal action, river flow stagnation, and negative flow rates cause low flow conditions in the receiving waters resulting in little to no dilution and multiple doses of the effluent.[632] Therefore, and due to the impaired condition of the San Joaquin River, presence of endangered species, and uncertainty of the reliability and accuracy of a "Box Model" study of the discharge and receiving water, the Regional Board did not grant dilution credits for the acute and chronic aquatic life criteria.[633] However, where there was dilution for the municipal beneficial use, the Regional Board granted dilution credits for nitrate.

Indeed, Regional Board staff informed the Regional Board that the Permit is a departure from normal permitting practices: "Normally, we are looking at impacts in the immediate vicinity of the discharge. In this case, this permit is addressing ecosystem concerns all the way

[629] Lodi Permit, p. F-20.

[630] Lodi Permit, p. F-20.

[631] Tracy Permit, pp. 4, F-22 to F-24, F-31.

[632] Stockton Permit, pp. F-18 to F-19.

[633] Stockton Permit, p. F-19.

down from about 50 miles along the entire length of the Sacramento River downstream of the discharge into and including in [sic] Suisun Bay . . . ."[634]

In other words, the Regional Board characterized the District's discharge as similar for purposes of comparing costs but different for purposes of application of regulations and policy, mixing zone determinations, and calculation of effluent limitations. The inescapable conclusion is that the Permit issued by the Regional Board attempts to have it both ways in order to arrive at a pre-determined destination.

d. The Regional Board Did Not Adequately Consider Feasible Alternatives

The Regional Board should have evaluated the "implementation of feasible alternative control measures which might reduce, eliminate, or compensate for negative impacts of the proposed action."[635] In addition to declining to assess the social and economic impacts on the Sacramento region, the Regional Board failed to consider the implementation of feasible alternative control measures that might counteract any alleged negative impacts of the District's discharge. This shortcoming was pointed out in the District's comments on the September Tentative Permit, and in response, the Regional Board added the following to the Fact Sheet:

> Various alternative measures, including those alternatives provided as part of the proposed waste discharge requirements, have been considered. After considering the alternatives, these waste discharge requirements which implement Title 22 (or equivalent) tertiary filtration, nitrification and denitrification will result in the best practicable treatment or control of the discharge necessary to assure that a pollution or nuisance will not occur and the highest water quality consistent with maximum benefit to the people of the State will be maintained.[636]

State Board guidance specifies that the Regional Board must include a "description of the alternative measures that were considered."[637] The Regional Board must do more than simply claim that it has "considered" other alternatives. The Regional Board must actually identify the

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[634] Hearing Transcript, pp. 70:21-71:4. While SRCSD does not dispute that the Regional Board can consider areas downstream, the point here is that comparison of this Permit to permits of other Delta dischargers is an apples-and-oranges comparison. Further, of course, any WQBELs based on far field conditions must be justified. Here, the WQBELs are not.

[635] APU 90-004, p. 5.

[636] Permit, p. F-96.

[637] APU 90-004, p. 6.

information in the record that was reviewed, and "bridge the analytic gap" linking the evidence to its ultimate conclusion.[638] Neither the Permit nor other supporting documents, such as an Antidegradation Report or even the Response to Comments, set forth the alternatives considered or the analysis. Therefore this statement, standing alone, is not sufficient to discharge the Regional Board's duty to consider alternatives.[639]

Had the Regional Board given due consideration to alternatives, it would have determined that full nitrification is not necessary to protect beneficial uses in the Sacramento River and the Delta. The Regional Board could reasonably find that removal of some additional amount of oxygen demanding material (presumably ammonia and BOD) from the effluent is necessary to ensure future compliance with dissolved oxygen standards and protect beneficial uses.[640] As discussed in section VI, however, full nitrification is another matter.

The Regional Board also failed to properly evaluate the requirement for the equivalent of Title 22 filtration. Although filtration is an available technology, its application to the District's discharge at the SRWTP is neither practicable, reasonable or necessary. As discussed in section V, the Sacramento River upstream of the SRWTP discharge does not meet Title 22 tertiary standards. Treating SRWTP effluent to Title 22 tertiary standards will not bring the Sacramento River downstream of the SRWTP discharge into compliance with Title 22 tertiary standards. In fact, because the focus is on evaluating the effect of a proposed action on "high quality" water, if 2.2 MPN/100 ml is the benchmark (Title 22 tertiary equivalent), the receiving water is not "high quality" and Resolution No. 68-16 does not apply. Further, as previously explained, the benefits to water quality from requiring filtration are *de minimis* and not commensurate with the cost of building and operating these treatment facilities. Nor does the

[638] *Topanga, supra*, 11 Cal.3d, p. 515.

[639] For an example of the level of detail the Regional Board has set forth in permits for other dischargers, see Order No. R5-2009-0099 (City of Galt) which includes over three pages detailing the alternatives analyzed and the reasons the permit approach was selected. (*Id.*, pp. F-54 to F-58.) "Each alternative was assessed for feasibility in implementation and effectiveness in improving water quality" and summarized in the permit. (*Id.*, p. F-55.)

[640] See section VI, *supra*.

Permit include any findings as to why the proposed treatments are necessary to assure that pollution or nuisance will not occur.[641]

The Regional Board did not properly assess the feasibility and effectiveness of alternative control measures in improving water quality as required by State Board guidance. Thus, the conclusion that the Permit implements BPTC cannot be sustained.

E. The Absence of Environmental and Public Health Benefits Renders the Challenged Permit Requirements Unreasonable

The Regional Board cannot rely on Resolution No. 68-16 to support requirements designed to reverse past-permitted changes in water quality. The State Board has made clear "[r]esolution No. 68-16 is not a 'zero-discharge' standard but rather a policy statement that existing quality be maintained when it is *reasonable* to do so."[642] Moreover, even if the state antidegradation policy arguably could be stretched to encompass the District's circumstances, the policy may not be read in isolation and does not absolve the Regional Board of its statutory obligations under Porter-Cologne.

The requirements imposed in the Permit in the name of antidegradation are unreasonable and conflict with the general policies of Porter-Cologne. The State Board has declared "[t]he resolution is consistent with state statutes," including Water Code section 13000.[643] Water Code section 13000 provides that "activities and factors which may affect the quality of the waters of the state shall be regulated to attain the highest water quality which is *reasonable*, considering all demands being made and to be made on those waters and the total values involved, beneficial and detrimental, economic and social, tangible and intangible."[644] To comply with the reasonableness requirements of Porter-Cologne and Resolution No. 68-16, the Regional Board would have to find, based on evidence in the record, that requiring nitrification, denitrification, and the equivalent of Title 22 filtration with ultraviolet light or chlorine disinfection is reasonable. The

[641] "Pollution" means an alteration of water quality to a degree that unreasonably affects beneficial uses, or facilities which serve the beneficial uses. (Wat. Code, § 13050(l).) No evidence supports a finding of pollution or nuisance.

[642] State Board Order No. WQ 86-8, p. 29, emphasis added.

[643] State Board Order No. WQ 86-8, p. 29.

[644] Wat. Code, § 13000, emphasis added.

sparseness of the Regional Board's "analysis" to support a finding of reasonableness is hardly surprising, in light of overwhelming evidence in the record that the requirements for advanced treatment are unwarranted.

The treatment requirements identified as BPTC in the Permit would cost the Sacramento region over $2 billion. This would equate to an approximate 309% increase in monthly residential sewer rates for existing ratepayers, an approximate 464% increase for in-fill development fees, and an approximate 470% increase for new development fees.[645] The socioeconomic impacts of the increased costs for existing and new ratepayers would understandably be significant.[646] In contrast, based on uncontroverted evidence in the record, the environmental benefit is negligible, nonexistent, or at most speculative for nearly every measured parameter in the District's discharge. The District does not dispute that some level of ammonia load reduction will help to ensure that the dissolved oxygen objective in the Delta is met even in exceptionally dry years.[647] The issues pertaining to dissolved oxygen can be resolved through implementation of reductions in oxygen demand as a separate requirement of the Permit. With this single exception, however, the record shows that the District's actual impact to water quality is not significant and does not cause or contribute to an exceedance of any water quality objective in the Sacramento River outside the boundaries of a well-defined, small, and approvable mixing zone.

The Permit attributes—or at least hypothesizes—that additional benefits will accrue as a result of requiring the District to fully nitrify its effluent. As fully detailed elsewhere in this document, these asserted benefits are nonexistent, *de minimis*, and/or speculative, with many asserted benefits based on unproven research hypotheses.[648] Benefits that will accrue from

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[645] The percent increases are based on estimated rates and fees calculated from planning level estimates, as discussed in section IV, above. The specific rates and fees to be paid by District customers would depend on treatment technologies employed to achieve compliance with all new requirements, but the planning level costs are representative.

[646] See section IV, *supra*.

[647] District's October 2010 Comments and Evidence Letter, pp. 40-43; see section VII, *supra*.

[648] See section VI, *supra*.

denitrification are equally uncertain.[649] The Permit fails to explain how requiring the District to meet the MCL at the end-of-pipe in a discharge to the Sacramento River will protect customers of downstream drinking water agencies many miles away. The alleged benefits of the tertiary treatment requirements are not merely speculative—they simply do not exist.[650] The pathogen reductions called for in the Permit are intended to protect downstream water suppliers, agricultural irrigators, and recreational users of the river.[651] As discussed in detail elsewhere, the uncontroverted evidence in the record is that all of these uses are protected with current levels of treatment and disinfection.

The Regional Board also failed to consider the adverse environmental impacts associated with the Permit requirements. Advanced wastewater treatment processes produce environmental impacts in the forms of increased power consumption, associated increases in greenhouse gas emissions, and "cross media impacts." Cross media impacts are the interrelated effects caused by removal of a constituent from one medium and its transfer to one or more other media. Microfiltration results in the transfer of constituents from wastewater into biosolids, air, and/or concentrated waste streams. Depending on regulatory limits, additional treatment of the biosolids, air, and/or concentrated waste streams may be required. While the monetary costs of advanced treatment implementation were estimated, the associated environmental impacts of advanced treatment due to increased power consumption and cross media impacts were not given due consideration by the Regional Board. The operation of each advanced treatment process would increase electricity consumption and thus greenhouse gas emissions above those generated by existing SRWTP secondary treatment processes.[652] While not quantified, these environmental impacts must be considered as costs and consequences associated with advanced treatment.

[649] See section VI, *supra*.

[650] See section V, *supra*.

[651] Permit, pp. F-72 to F-80.

[652] Costs/Benefits Analysis, pp. X-XII.

F. Conclusion

The Regional Board strained to find a basis for the very costly Permit limitations through an unprecedented and nominal antidegradation analysis for an already-permitted discharge. The Regional Board's analysis did not comply with applicable regulations and State Board guidance, and the Regional Board's result-oriented and superficial findings and conclusions are inadequate and unsupported by evidence. The State Board should determine that the discussion and findings under the heading "Satisfaction of Antidegradation Policy" are improper.

IX. OTHER MIXING ZONES WERE IMPROPERLY DENIED AND AN INAPPROPRIATE CHRONIC TOXICITY TRIGGER WAS ESTABLISHED

In accordance with the SIP, Basin Plan, and TSD,[653] the District provided extensive documentation and evidence to support a proposed 60-foot long acute mixing zone, a 350-foot long chronic mixing zone,[654] and a harmonic mean flow human health mixing zone at the point where complete mixing of the SRWTP effluent and Sacramento River occurs, approximately three miles downstream from the discharge point.[655] However, despite the overwhelming and complete evidence submitted by the District, the Permit denies an acute mixing zone even though it meets the requirements of the SIP, and denies mixing zones and dilution credits for specific compounds such as ammonia, nitrate, chlorpyrifos and diazinon, copper, cyanide, and chronic toxicity. The improper denials of mixing zones for ammonia and nitrate are addressed in sections VI and VII, *supra,* and are not repeated here. The Regional Board's improper actions with respect to the other compounds are identified here. In addition, the District explains the related conclusion that the Permit established an inappropriate chronic toxicity trigger.

As a preliminary matter, the District acknowledges that the Regional Board has some discretion in granting mixing zones and dilution credits. However, that discretion is not unfettered and the Regional Board must explain its denials based on consideration of the facts of

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[653] TSD.

[654] Technical Memorandum, "Mixing Zones and the Prevention of Acutely Toxic Conditions," to Bob Seyfried and Vyomini Pandya SRCSD (July 13, 2009).

[655] SRCSD, "Sacramento River Harmonic Mean Mixing Zone Report," Larry Walker Associates (June 2010) (LWA SRCSD (June 2010)); see also District's October 2010 Comments and Evidence Letter, pp. 81-85.

the discharge and evidence in the record.[656] Further, the State Board has specified the measure for granting mixing zones:

> While granting a mixing zone is discretionary, in reaching our conclusion we consider that the Regional Board did not fully consider information in the record, the high cost to meet the effluent limitations without allowing this dilution credit, and the lack of evidence of any harm associated with such a mixing zone.[657]

The District performed extensive water quality modeling to determine the extent of actual dilution downstream of the diffuser for the SRWTP discharge. The modeling of the receiving water and mixing zones has been peer reviewed and approved by the Regional Board for use in permit development, including WQBEL calculation.[658]

The State Board also requires consideration of information in the record, the cost of treatment without allowing the dilution credit, and evidence of harm associated with the mixing zone. The District has supplied information demonstrating the proposed acute mixing zone is protective of aquatic life, and that the proposed mixing zones for specific constituents are appropriate and necessary.[659] While the District provided a complete analysis and presentation of the projected costs for various levels of treatment, the costs of treatment associated with denial of the mixing zones was not discussed or considered in the Permit as required.[660] Thus, the information in the Permit fails to provide proper justification for not allowing an acute mixing zone and for denying dilution credits for the other identified constituents.[661] Those denials are inappropriate and the mixing zones should be allowed.

[656] State Board Order WQO 2004-0013, *supra*, p. 10.

[657] State Board Order WQO 2004-0013, *supra*, p. 12.

[658] See District's October 2010 Comments and Evidence Letter, pp. 81-84; see also Dynamic Model Acceptance Letter.

[659] Technical Memorandum, "Mixing Zones and the Prevention of Acutely Toxic Conditions," to Bob Seyfried and Vyomini Pandya SRCSD (July 13, 2009).

[660] See section IV, *supra*.

[661] Permit, pp. F-28 to F-44.

A. The Denial of an Acute Aquatic Life Mixing Zone Is Not Justified

The Permit finds that the District's proposed acute aquatic life mixing zone of 400 feet wide by 60 feet downstream of the diffuser meets all of the requirements of the SIP.[662] To make this finding, the Permit reviews the eleven SIP criteria and provides a brief explanation for each one as to how and why the acute mixing zone complies. For example, the second SIP criterion states that the acute aquatic life mixing zone shall not "cause acutely toxic conditions to aquatic life passing through the mixing zone."[663] In response, the Permit finds that the minimum float time for passing through the acute aquatic life mixing zone is 2.8 minutes, which is well below U.S. EPA's recommended float time of 15 minutes.[664] The Permit also finds that compliance with the acute toxicity effluent limit based on acute bioassays using 100% effluent will ensure that acutely toxic conditions to aquatic life passing through the acute mixing zone do not occur.[665]

Yet, despite these Permit findings, an acute aquatic life mixing zone is denied in general because of unexplained "concerns with aquatic toxicity in the Delta . . . ."[666] The Permit further concludes that an acute aquatic life mixing zone is not allowed because the Delta is impaired for unknown toxicity and has experienced significant declines in Delta fish populations, i.e., the POD.[667] Such a statement contradicts the Permit finding that the mixing zone would not cause acutely toxic conditions to aquatic life passing through the mixing zone. If the mixing zone is not acutely toxic to passing organisms, it is difficult to ascertain how the granting of such a mixing zone would further cause concerns with acute aquatic toxicity in the Delta downstream of the mixing zone. Moreover, the Permit wholly fails to include any references or information that identify or link the alleged aquatic toxicity downstream in the Delta to allowing an acute mixing zone for aquatic life for the SRWTP discharge.

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[662] Permit, pp. F-34 to F-36.

[663] SIP, p. 17.

[664] Permit, p. F-34.

[665] Permit, pp. F-34 through F-35 (the Permit references the "chronic" mixing zone, however, this appears to be in error as the discussion in question is specific to the acute mixing zone).

[666] Permit, p. F-36.

[667] Permit, p. F-36.

Generally, in accordance with the TSD, mixing zones are allocated for types of criteria or objectives. If it can be demonstrated that the acute mixing zone is sufficiently sized to prevent any acute toxicity to organisms passing though the zone, the acute mixing zone is considered protective of the aquatic life beneficial use.[668] Thus, if the acute mixing zone is sufficiently sized to comply with the SIP, Basin Plan, and U.S. EPA regulations and guidance for ensuring the intended level of protection for the aquatic life beneficial use, the Regional Board should find the mixing zone appropriate and approve it for use in derivation of effluent limits for the discharge.

As the Permit finds, the acute aquatic life mixing zone complies with the SIP.[669] To deny the allowance of the acute mixing zone after making such a finding is completely at odds with this finding and unreasonable. The Regional Board must explain its conclusion in the Permit.[670] This has not occurred.

Furthermore, the proposed acute mixing zone for the District's discharge has been established in a manner that is consistent with acute mixing zones granted by the Regional Board in other NPDES permits. The denial of an acute mixing zone here, without proper cause, is inconsistent with the Regional Board's practice of granting acute mixing zones to other POTWs.[671]

B. The Regional Board Improperly Denied the Use of a Dynamic Model For Copper

The Permit finds that assimilative capacity for copper is available but does not include final WQBELs based on assimilative capacity or dynamic modeling because dilution credits are deemed not necessary.[672] Instead, the Permit includes end-of-pipe WQBELs for copper using a steady state effluent limit derivation approach. The differences in the limits derived from the dynamic model as compared to the steady state approach are as follows: 7.7 μg/L AMEL and

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[668] SIP, p. 17.

[669] Permit, pp. F-34 to F-36.

[670] State Board Order No. WQ 95-4, *supra*, pp. 10, 21-22.

[671] See, e.g., Order Nos. R5-2009-0074 (City of Angels), R5-2009-0078 (Chester Public Utilities District), R5-2010-0019 (City of Chico), R5-2008-0179 (Discovery Bay CSD); see also District's October 2010 Comments and Evidence Letter, pp. 76-77.

[672] Permit, p. F-41.

9.8 μg/L MDEL; and, 7.3 μg/L AMEL and 9.3 μg/L MDEL, respectively. Although differences between the limits appear to be modest, failure to use the dynamic model results may put the District in jeopardy for noncompliance. Specifically, due to concerns of concentrating constituents via water conservation, the copper concentrations in the SRWTP effluent may increase in the future and may exceed the steady state limits adopted into the Permit.[673] Thus, the determination that the steady state limits are appropriate because the District can meet them currently fails to consider near-term future conditions. The failure to use the approved dynamic model to calculate effluent limits for copper is not justified by the findings in the Permit or evidence in the record.

Regional Board staff accepted the District's dynamic modeling tool as being appropriate for use in the NPDES permit renewal process, stating:

> Based on the results of the extensive reviews and validation studies that have been performed, Regional Water Board staff will proceed to use the District's modeling tools for the NPDES permit renewal process. Specifically, the tools are judged to be suitable for use in the dynamic near field modeling of the District's discharge and the derivation of water quality based effluent limits (WQBELs). Use of the dynamic modeling approach for derivation of WQBELs is specifically authorized in the State Implementation Plan (SIP) and in the USEPA Technical Support Document (TSD) for Water Quality-based Toxics Control.[674]

As the District's models were developed in a sound and scientifically defensible manner, with extensive review by Regional Board staff and the Regional Board's independent modeling experts,[675] the results of the models indicating concentrations and compliance with the magnitude, duration, and frequency of the criteria and objectives are accurate and defensible. U.S. EPA guidance states, "[d]ynamic models make best use of the specified magnitude, duration, and frequency of water quality criteria and thereby provide a more accurate calculation of discharge impacts on ambient water quality .... [I]f adequate receiving water flow and effluent concentration data are available to estimate frequency distributions, EPA recommends that one of the dynamic wasteload allocation modeling techniques be used to derive wasteload allocations

[673] District's October 2010 Comments and Evidence Letter, p. 87.

[674] Dynamic Model Acceptance Letter.

[675] See, e.g., Dynamic Model Acceptance Letter.

[i.e. effluent limits] which will more exactly maintain water quality standards."[676] Where available, a dynamic model is preferable to a steady state model, as the dynamic approach is a more robust and accurate representation of the conditions in the receiving water.

Thus, effluent limits calculated using the dynamic models are more accurate and reflective of ambient water quality in the vicinity of the discharge. If adequate data and dynamic modeling tools and results are available, it is inappropriate to evaluate effluent limits using a steady state approach *as was done here for copper*. The steady state and dynamic approaches are not equivalent; the dynamic approach is acknowledged as being superior in all respects.

The effluent limits shown in Table F-11 of the Permit and calculated using the dynamic model based on acute and chronic mixing zones are protective of beneficial uses, attainable based on plant performance, and calculated using the most robust and accurate approach available.[677] The Regional Board should have adopted these as the appropriate effluent limits for copper.

C. The Regional Board Improperly Denied Acute Aquatic Life Dilution Credits for Cyanide

For cyanide, the Permit grants a dilution credit based on available chronic aquatic life dilution.[678] Conversely, acute dilution is not allowed because the Permit finds that it is not needed.[679] Although a dilution credit based on chronic aquatic life is allowed, the Permit does not incorporate WQBELs calculated from the dynamic model but instead calculates a performance-based limit. For example, using the dynamic model and granting only a chronic aquatic life mixing zone, the WQBELs for cyanide would be 11 µg/L for the AMEL and 22 µg/L for the MDEL. Without any discussion or rationale, the Regional Board finds that granting dilution credits based on the dynamic models could allocate an unnecessarily large portion of the receiving water's assimilative capacity for cyanide and violate the antidegradation policy.[680]

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[676] Memorandum from Martha G. Prothro to Water Management Division Directors, Regions I-X, re: Office of Water Policy and Technical Guidance on Interpretation and Implementation of Aquatic Life Metals Criteria, Attachment #3, Guidance Document on Dynamic modeling and Translators (August 1993) (Prothro Guidance Document).

[677] Permit, p. F-41.

[678] Permit, p. F-41.

[679] Permit, p. F-41.

[680] Permit, p. F-66.

Based on this vague and unsubstantiated finding, the Permit instead includes a MDEL for cyanide of 11 µg/L.[681]

As discussed previously, the use of dynamic models is a superior approach as it provides for a more accurate and reasonable representation of the conditions in the receiving water.[682] Further, when calculating WQBELs, the first step is not to determine what is necessary for compliance, but rather to determine the appropriate WQBEL considering available dilution credits and facts of the specific discharge under consideration. When there are significant differences between the calculated WQBEL and plant performance, the Regional Board appropriately may reserve some portion of assimilative capacity. When exercising this discretion, the Regional Board must explain its actions in the findings.[683] Moreover, if the Regional Board's justification is because of potential violations to the antidegradation policy, then the Regional Board must explain this rationale.[684] This has not occurred.[685]

Further, the Permit indicates that for cyanide, discharges from the SRWTP use only 2.3% of the assimilative capacity of the Sacramento River.[686] Based on this information, it is difficult to understand how the Regional Board can legitimately find that the granting of the dilution credit, and derivation of effluent limits based on the dilution credit, would "allocate an unnecessarily large portion of the receiving water's assimilative capacity," and "violate the Antidegradation Policy."[687]

With respect to the adopted performance-based limit and the conclusion that no more is needed, the Regional Board failed to consider the significant modifications to the SRWTP that would occur based on other adopted Permit limits and the impact of water conservation and

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[681] Permit, pp. F-13, F-66.

[682] See section IX.B, *supra*.

[683] State Board Order WQO 2004-0013, *supra*, p. 13 ("The issue is not that the Regional Board has the burden of proof in denying mixing zones, but that it must explain its actions in the findings.").

[684] State Board Order WQO 2004-0013, *supra*, p. 13.

[685] See Permit, p. F-66.

[686] See Permit, Table F-18, p. F-98.

[687] Permit, p. F-66; see section VIII, *supra*; see also District's October 2010 Comments and Evidence Letter, pp. 61-62.

growth on effluent levels of cyanide. Both of these are unknown factors, and it is uncertain how such dramatic changes may impact effluent levels of cyanide and future compliance with effluent limits.[688]

D. The Regional Board Improperly Denied Dilution Credits for Chlorpyrifos and Diazinon

The Permit includes a combined effluent limit for chlorpyrifos and diazinon based on waste load allocations (WLAs) contained in the Basin Plan.[689] The TSO finds that the SRWTP cannot consistently comply with the effluent limits, and protects the District from mandatory minimum penalties for a period of up to five years.[690] The Permit denies dilution credits, claiming that because dischargers must meet the WLA, no dilution credits can be granted for compliance with the water quality objectives for chlorpyrifos and diazinon.[691] The Permit also states that, "[t]he WLA have been adopted in the Basin Plan as water quality objectives and dilution are [sic] not allowed."[692] The Regional Board's denial of dilution credits here is improper for various reasons. First, the WLA is not an adopted Basin Plan water quality objective. The specific water quality objectives for chlorpyrifos and diazinon applicable to the Delta are contained in Table III-2A of the Basin Plan.[693] They are specific numeric values that include maximum concentrations for 1-hour (acute) and 4-day (chronic) averaging periods.[694] In contrast, the WLA is included in the Implementation Plan and states as follows: "The waste load allocations (WLA) for all NPDES-permitted dischargers, load allocations (LA) for nonpoint source discharges, and the loading capacity of each of the Sacramento-San Joaquin Delta

[688] District's October 2010 Comments and Evidence Letter, pp. 87, 98.

[689] Permit, pp. F-68 to F-69; see Basin Plan, pp. III-6.01, IV-26.00 to IV-26.01.

[690] TSO, pp. 3, 5.

[691] Permit, p. F-68.

[692] Permit, p. F-42.

[693] Basin Plan, p. III-6.01.

[694] Basin Plan, p. III-6.01.

Waterways . . . shall not exceed the sum (S) of one (1) as defined below. [equation in the original]."[695]

In addition, when adopting effluent limits to protect numeric water quality criteria (the water quality objectives for chloryprifos), the effluent limitations need to be "*consistent with* the assumptions and requirements of any available [WLA] for the discharge."[696] The effluent limitation need not mirror or exactly replicate the WLA. In this case, the Basin Plan does not specifically state that mixing zones shall be denied and dilution credits not considered when implementing the collective WLA for chlorpyrifos and diazinon. Further, determinations of impairment alone (the basis for adoption of a WLA) are not sufficient for denial of a dilution credit. The State Board has stated as follows: "In Order No. WQO 2001-06 (Tosco), we addressed this same issue. There, we stated that 'the listing itself is only suggestive; it is not determinative.' We stated that in developing effluent limitations, regional boards must review available ambient data and base their determinations on those data."[697] By extension, denial of assimilative capacity based on the existence of the WLA. Merely because a WLA is an adopted part of the Basin Plan does not mean there is no assimilative capacity for the constituent of concern. In this case, there is assimilative capacity available and a dilution credit should be granted in the determination of effluent limits for chlorpyrifos and diazinon.

At the very least, the Regional Board has an affirmative duty to explain its rationale for denying dilution in the Permit and why an effluent limit that is designed to be consistent with the WLA automatically means that dilution credits must be denied.[698] The Permit does not contain any such rationale or explanation.

E. The Regional Board Improperly Denied a Chronic Toxicity Trigger of 13.3 TUc

The State Board should determine that the appropriate toxicity trigger for whole effluent toxicity (WET) is 13.3 TUc.

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[695] Basin Plan, p. IV-36.03.01.

[696] 40 C.F.R. § 122.44(d)(1)(vii)(B), emphasis added.

[697] State Board Order WQO 2004-0013, *supra*, p. 14.

[698] See State Board Order No. WQ 95-4, *supra*, pp. 10, 21-22.

The Permit includes provisions for chronic WET that are designed to ensure compliance with the Basin Plan's narrative toxicity objective.[699] Included in the chronic WET provisions is a numeric toxicity monitoring trigger of 8 TUc (where TUc=100/NOEc).[700] If chronic toxicity in the effluent exceeds the trigger level of 8 TUc, the District must begin accelerated monitoring and initiate a toxicity reduction evaluation.[701] Based on the District's dynamic modeling results, the appropriate chronic toxicity trigger at the edge of the chronic mixing zone is 13.3 TUc, a fact which is explicitly acknowledged in the Permit Fact Sheet.[702] However, for no valid reason, the Permit includes a toxicity trigger set at 8.0 TUc. At most, the Permit states that the trigger is set to 8.0 TUc because that is what was in the previous permit and the District has shown consistent compliance with this trigger.[703] The Permit fails to provide any rationale or reasonable explanation as to why the dynamic modeling results should be ignored. Like with the application of mixing zones to specific constituents, the Regional Board must explain its denial of dilution credits here (i.e., difference between 8.0 TUc and 13.3 TUc) based on the facts of the discharge.[704] This has not occurred.

Further, the Permit includes a study requirement to determine if it is feasible to use *Hyallela azteca* for both acute and chronic toxicity.[705] Assuming *arguendo* that it is feasible to use *Hyallela azteca* for chronic WET testing, it is possible that the chronic trigger of 8.0 TUc will not be sufficient and the District may not comply with a chronic toxicity trigger of 8.0 TUc.[706] Failure to meet the chronic toxicity trigger results in the need to conduct accelerated monitoring and initiate a toxicity reduction evaluation (TRE), which are costly endeavors. Such costs are improper, especially considering that additional available chronic dilution for chronic toxicity

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[699] Permit, pp. 26-28.

[700] Permit, p. 27.

[701] Permit, p. 27.

[702] Permit, p. F-112.

[703] Permit, p. F-112.

[704] State Board Order WQO 2004-0013, *supra*, p. 10.

[705] Permit, pp. 28-29.

[706] See Permit, p. F-111.

exists. Thus, denial by the Regional Board was improper because it did not fully consider all information in the record.[707]

X. THE PERMIT MONITORING REQUIREMENT FOR NDMA VIOLATES FEDERAL REGULATIONS AND THE SIP

The State Board should determine that the Permit requires an improper method for monitoring of NDMA. In section IV.A.1.a (Table 6), the Permit establishes, for the first time, effluent limitations for NDMA for the SRWTP.[708] The Monitoring and Reporting Program (MRP) of the Permit requires the District to conduct effluent monitoring for NDMA using U.S. EPA Method 521.[709] U.S. EPA Method 521 provides procedures for "the determination of nitrosamines in finished drinking water."[710] The method has not been evaluated for untreated source waters and other types of water supplies.[711]

More importantly, requiring effluent testing for NDMA using U.S. EPA Method 521 violates federal regulations and the SIP without the District's consent. When requiring monitoring to determine compliance with permit effluent limits, monitoring must be required, "[a]ccording to test procedures approved under 40 C.F.R. Part 136 for the analyses of pollutants or another method is required under 40 C.F.R. subchapters N or O."[712] When there are no approved methods under 40 C.F.R. Part 136, monitoring must be conducted according to a test procedure specified in the Permit.[713] For NDMA, 40 C.F.R. Part 136 identifies multiple approved methods— U.S. EPA Method 521 is not one of them.[714] The SIP allows for alternative test methods in specified circumstances, including: "[w]hen the discharger and the RWQCB agree to

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[707] State Board Order WQO 2004-0013, *supra*, p. 12.

[708] Permit, p. 14.

[709] Permit, p. E-6.

[710] Method 521, Determination of Nitrosamines in Drinking Water by Solid Phase Extraction and Capillary Column Gas Chromatography with Large Volume Injection and Chemical Ionization Tandem Mass Spectrometry (MS/MS) (September 2004), U.S. EPA Document # EPA/600/R-05/054 (U.S. EPA Method 521), p. 521-2.)

[711] U.S. EPA Method 521, p. 521-2.

[712] 40 C.F.R. § 122.44(i)(1)(iv).

[713] 40 C.F.R. § 122.44(i)(1)(iv).

[714] 40 C.F.R. § 136.3, Table IC.

include in the permit a test method that is more sensitive than those specified in 40 CFR 136 (revised as of July 3, 1999)."

Compliance with the procedures identified in 40 C.F.R. Part 136 is approved pursuant to the federal regulations, or required when submitting reports under an NPDES Permit unless an alternate test procedure is agreed to by the discharger and the Regional Board.[715] The District has not agreed at this time to include U.S. EPA Method 521 as an alternative to those methods approved in Part 136 for NDMA.[716] Further, there is no evidence to suggest that U.S. EPA Method 521 has been approved pursuant to the federal regulations. Accordingly, requiring the use of U.S. EPA Method 521 to monitor effluent for NDMA without the District's consent violates the SIP and federal regulations and must be removed. Regional Board staff commented that the District has previously used U.S. EPA Method 521 for NDMA.[717] However, previous District monitoring using U.S. EPA Method 521 is irrelevant because it was not required by the previous permit and was not conducted to ensure compliance with effluent limitations. Thus, previous monitoring was not required to comply with the regulations in the SIP or 40 C.F.R. Part 136. The MRP is inconsistent with those regulations.

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[715] 40 C.F.R. §§ 136.4-136.5.

[716] District's October 2010 Comments and Evidence Letter, p. 106.

[717] Staff Response to Comments, p. 67.

XI. CONCLUSION

For the foregoing reasons, Petitioner requests that the State Board grant the relief requested herein.

SOMACH SIMMONS & DUNN
A Professional Corporation

DATED: January 10, 2011

By: _____
Paul S. Simmons
Attorneys for Petitioner
SACRAMENTO REGIONAL COUNTY
SANITATION DISTRICT

OFFICE OF THE COUNTY COUNSEL

DATED: January 10, 2011

By: _____
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SANITATION DISTRICT

SOMACH SIMMONS & DUNN
A Professional Corporation

PROOF OF SERVICE

I am employed in the County of Sacramento; my business address is 500 Capitol Mall, Suite 1000, Sacramento, California; I am over the age of 18 years and not a party to the foregoing action.

On January 10, 2011, I served a true and correct copy of:

PETITION FOR REVIEW
(Wat. Code, § 13320),

XXX (by mail) on all parties in said action, in accordance with Code of Civil Procedure §1013a(3), by placing a true copy thereof enclosed in a sealed envelope, with postage fully paid thereon, in the designated area for outgoing mail, addressed as set forth below.

Pamela Creedon, Executive Officer
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Rancho Cordova, CA 95670

Kenneth D. Landau, Assistant Executive Officer
Regional Water Quality Control Board,
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On January 10, 2011, I also provided a **courtesy copy** of the **PETITION FOR REVIEW (Wat. Code, § 13320)** (and its accompanying Exhibits) on compact disc (CD) by mail on the following individuals/entities:

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I declare under penalty of perjury that the foregoing is true and correct. Executed on January 10, 2011, at Sacramento, California.

Crystal Rivera